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8th Year of Publication

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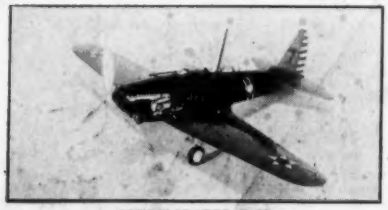

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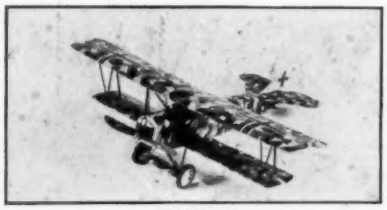

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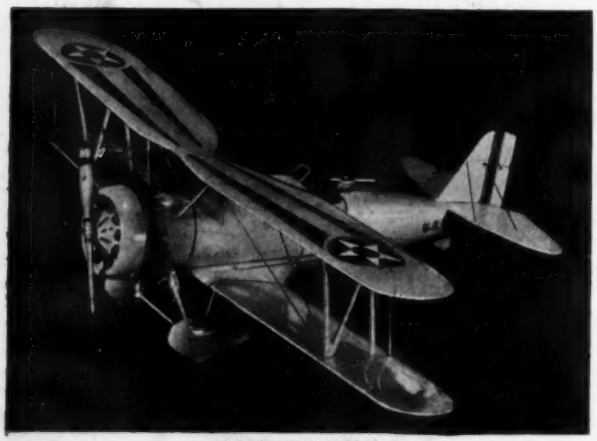

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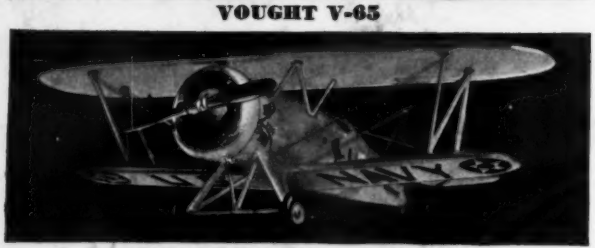

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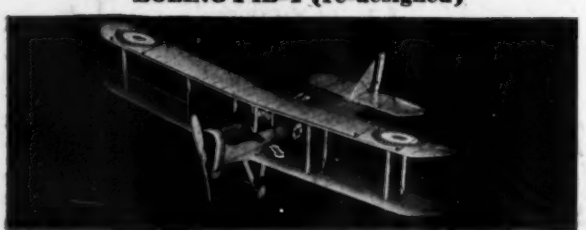

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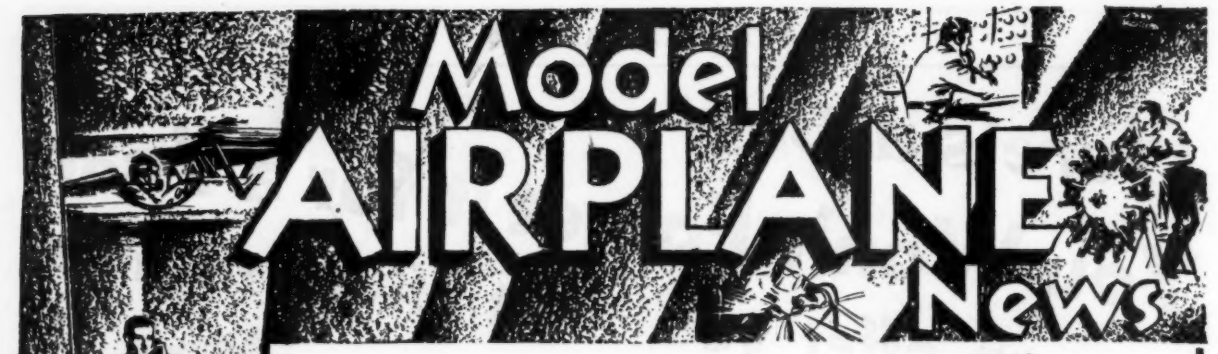

8th YEAR OF PUBLICATION

VOL. XIV *NO. 6*

Edited by Charles Hampson Grant

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In Our Next Issue

U.S. Navy Fighters—Past and Present, by Gordon S. Williams gives you a most informative history of planes of the U.S. Navy, from the early days to the present time.

We have a scoop for you in **How to Build the Caproni Fighter,** by William Winter. It gives you full details to construct a flying scale model of one of Italy's first line ships.

Another **Navi-Goid** problem will help you to spend an interesting hour or so and improve your knowledge of navigation.

How to Build a Trophy Winner, by Kenneth Ernst gives you complete information to build the fine contest fuselage model that won the Stout Trophy in 1935.

Joseph Kovel tells you more about the design and building of gas models in **Ways and Means of Gas Model Success.**

In **Frontiers of Aviation,** Robert C. Morrison gives you the latest aviation news and tells you how to build a scale model of the new Fairey "Battle."

How to Design Your Fuselage Model, Gas Lines, Air Ways, a detailed drawing by Willis Nye, and **Aviation Advisory Board** give you a world of additional information that will interest you and that you will wish to have.

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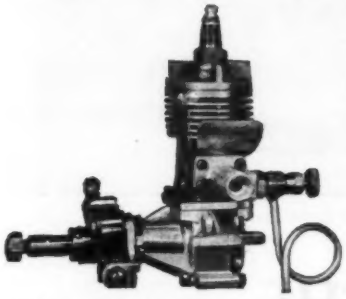

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Everything is in the kit including plug, coil, condenser, tank, ignition wire, cylinder, piston, connecting rod, timer, crankshaft, all screws, nuts, bolts, etc. Every part is fully machined and finished. No oil, gas, batteries or propeller included. Postpaid for only.....

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31. Breaker assembly compact, foolproof, long wearing, replaceable and adjustable.
32. Tungsten contact point.
33. Instruction book included.
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35. Propeller blank included with finished motor.
36. Long timer lever for safe speed adjustment.
37. Motor starts and runs on 2 ounce battery.
38. Finished motor guaranteed against defects.
39. No vibration.
40. Speed range 500 to 10,000 R.P.M.
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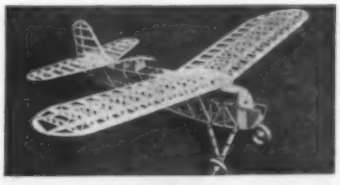


G.H.Q. "Loutrel" Sportster not covered to show structural details.

G. H. Q. MODEL AIRPLANE CO.

564 Southern Boulevard
NEW YORK, N. Y.

A two-place Ford-motored Pietenpol. Climb with full load is 350 ft. per min.: with light load, 800 ft. per min.

The Development of the Lightplane

Details of Some Outstanding Lightplanes and the Part They Have Played in the Advancement of Aviation

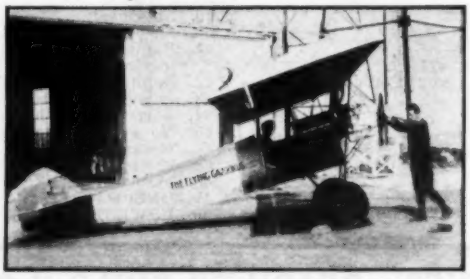
By MANLEY MILLS

THE term, "lightplane," usually applies to any small airplane of low horsepower having a seating capacity of one or two persons. An airplane weighing over 700 pounds empty, or with an engine of over 50 horsepower, is not usually regarded as a lightplane. Most of the single-seaters, in fact, seldom weigh more than half that much, and are usually powered with engines of less than 35 horsepower.

Contrary to popular belief, the lightplane is not a recent development. The demand for a small, inexpensive machine, goes back over a quarter of a century. Some of the early lightplanes performed just as well as most of the modern jobs, and in some cases, even better. A great many features found in modern airplane construction were used in some long-forgotten lightplane of years ago.

Within the past few years, homebuilt lightplanes have become very popular, hundreds having been built and successfully flown. In practically every case, they have performed as well as factory-built jobs. Of course, many have been built that wouldn't even leave the ground, and maybe it's just as well that they didn't. The fact that they failed to fly showed that they were either under powered or improperly designed. Either characteristic would have made them more or less dangerous in the air.

The amateur constructor may choose either of two methods: he may build the plane from commercial blueprints, or he may design the ship from the ground up. The former course is, no doubt, the safest for a rank novice. Yet, anyone who spends a reasonable amount of time in studying the principles of airplane construction, can build a satisfactory lightplane of his own design if he has the average mechanical ability. A great deal can be learned by studying the successful lightplanes of past years, as well as those of today. A wise builder won't experiment with any radical features on his first ship, but will work according to standard practice and use time-tried features.



A flivver built by Ervin Quinn of Roebuck, S.C., powered with a Chevrolet motor

The designer of a lightplane usually reverses the procedure followed in designing a large commercial machine. A big aircraft corporation has large resources at its disposal, so when a certain plane is designed, a suitable engine can be selected from the many types available. But the lightplane designer is not so fortunate. His capital is nearly always limited, and he has a very narrow choice of engines. In fact, there are very few real lightplane engines on the market, and they are far too expensive. So the first thing the designer does is to decide upon the power plant he is going to use. Then, he designs the airplane to take advantage of every ounce of power the engine can develop. Even a poorly designed plane can be made to fly by using a powerful enough engine, but, obviously, that is poor economy. Low cost and inexpensive operation are among the main requirements of any lightplane, but they can hardly be met by an inefficient machine that needs a powerful engine to drag it through the air.

A small single-seater airplane can be made to fly with unbelievably low power if enough attention is given to refining the design. If you will turn back the pages of aviation history, you will find scores of examples where efficient design has made flight possible with a very small engine.

Regarding the origin of the lightplane, the first successful Wright machine really belongs to that class, for it weighed only 400 pounds and was powered with an engine that delivered a bare 12 horsepower.

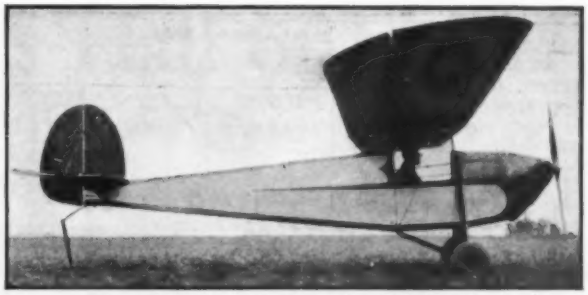
Among the real old-timers in the lightplane class, perhaps the best-known were the A. V. Roe triplane and the Santos-Dumont "Demoiselle."

The Roe triplane, powered with a 9 horsepower J. A. P. motorcycle engine, was built

Here is a Ford-powered air flivver four years old and still flying students and making money for the owner

Glen Smith and his Ford-powered ship. Wt. 835 lbs. with pilot and gas. High speed 85 m.p.h.; low 42 m.p.h.

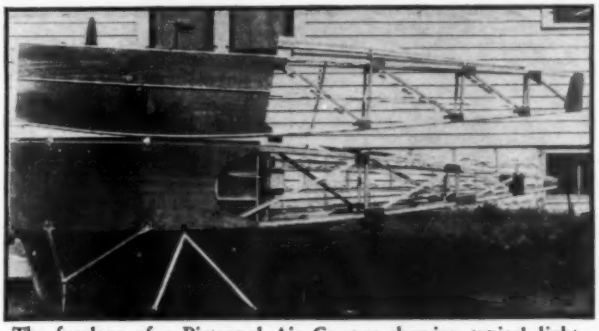
Original Pietenpol Sky Scout with "T" Ford motor



The Harlequin Longster produced by Les Long

in 1908. It was really a tandem affair, for the triplane tail was fully as large in area as the wings. A. V. Roe, it will be recalled, was the designer of the famous "Avro" line of airplanes, including the popular "Avian" two-seater biplane.

Weighing only 250 pounds, the "Demoiselle" was an extremely light machine, but wasn't so efficient on account of its very low aspect ratio. With a wingspread of 18 feet and a chord of 6 feet, the ratio was only 3 to 1. Twenty-six feet was the overall length of the ship. The power plant was a twin-cylinder, opposed, water-cooled Darracq engine, delivering 30 horsepower at 1600 revolutions per minute, with a five-foot propeller. In general appearance, the "Demoiselle" resembled a modern primary training glider. Built almost entirely of bamboo, the framework was typical of most early airplanes. The pilot sat under the wing between the landing wheels, while the engine was mounted at the leading edge.



The fuselage of a Pietenpol Air Camper showing typical lightplane construction employed

The motor Les Long made of parts from a Harley-Davidson motorcycle engine

In 1910, one of the lowest-powered planes in the history of aviation, the Sellers quadruplane, was built and flown successfully at Grahn, Kentucky, by Matthew B. Sellers. Though the engine developed only 4 horsepower, Mr. Sellers made some fairly long flights in his tiny four-winged affair. Powered with a Dutheil & Chamers two-cylinder, opposed, two-cycle engine, the entire machine, ready to fly, weighed only 80 pounds.

In 1912, E. M. Laird, noted today for his high-speed racing and commercial jobs, built a lightplane known as the Laird "Baby Biplane." He taught himself to fly in it, though he had never been in the air before, even as a passenger. He was only 16 years old at this time. The wings of the "Baby Biplane," typical of those on early ships, were very thin and deeply cambered. The wing tips were square, and the front spar also formed the leading edge. The tail surfaces were very large, the stabilizer being shaped like a semi-ellipse, with elevators of a semi-circular form. A four-cylinder Hofer air-cooled engine was installed. With a bore of 3⅛" and a stroke of 3¼", it developed about 12 horsepower at 1200 revolutions per minute.

When the Laird "Baby Biplane" first appeared on the field, many grave doubts were expressed by aviation experts. It didn't seem possible that it could get off the ground with its little engine. But, to the amazement of everybody, it not only flew but actually performed better than many of its contemporaries having three times its power.

The need for a folding airplane was recognized over twenty years ago. One of the outstanding small machines of 1912 was the Vendome folding monoplane, designed as a scouting plane for the French Army. It could be dismantled by two people in four minutes, and, when folded, could be stored in a space measuring 7 x 10 x 17 feet. Powered with a 50 horsepower Gnome revolving engine, the ship weighed 440 pounds. An unusual feature was the large diameter of the landing wheels, which was 3 feet and 10 inches. No doubt, such huge wheels caused a lot of resistance, but they were expected to facilitate landing in rough or grass-covered fields.

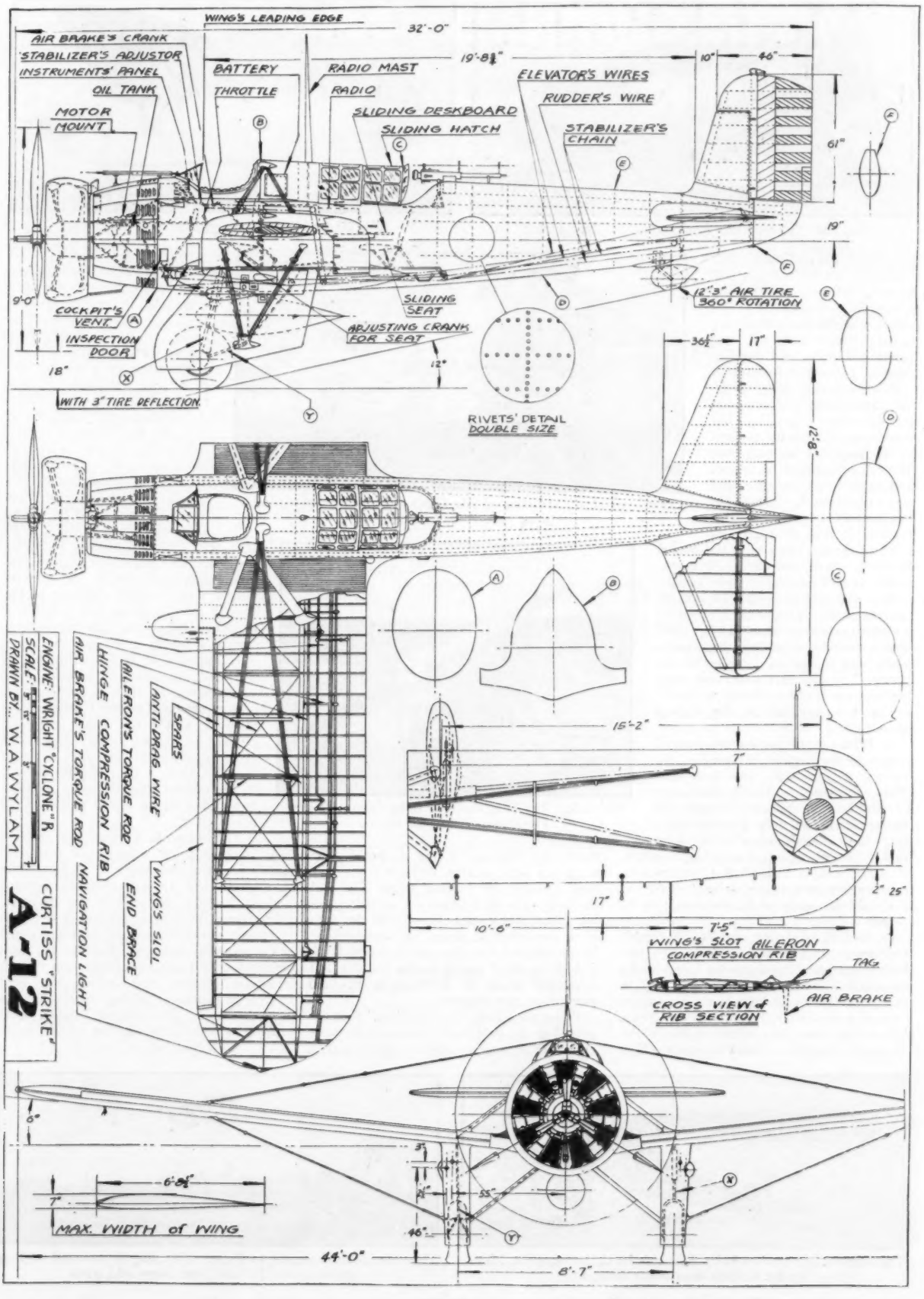
Appearing in 1916, a small scout biplane produced by the Curtiss Aeroplane & Motor Co. is of particular interest because of its tiny dimensions and resemblance to the familiar "Jenny." With a span of only 20 feet, its high speed was 100 miles an hour, powered with an OX-2 motor of 60 horsepower.

The Martin K-3, brought out in 1917, was another scout machine of unusually small size. The span was only 18 feet, while the length was 13 feet 4 inches. Several unique features, patented by its designer, Mr. James V. Martin, improved the performance greatly. Many of them are found on present-day airplanes. Perhaps the most interesting of these innovations was the retractable landing gear, which was very simple in operation, adding little weight to the structure. The Martin landing gear folded backward and up, the wheels going

(Continued on page 36)

The single-seater Corben Baby Ace with its charming pilot. Made by the Corben Sportplane Company

The Harlequin Longster in flight. This ship is powered with an engine made by Les Long from odd parts


WING'S LEADING EDGE
32'-0"
AIR BRAKE'S CRANK
STABILIZER'S ADJUSTOR
INSTRUMENTS' PANEL
OIL TANK
MOTOR MOUNT
BATTERY
THROTTLE
19'-8½"
RADIO MAST
RADIO
SLIDING DESKBOARD
SLIDING HATCH
ELEVATOR'S WIRES
RUDDER'S WIRE
STABILIZER'S CHAIN
10"
46"
61"
19"
9'-0"
COCKPIT'S VENT.
INSPECTION DOOR
18"
SLIDING SEAT
ADJUSTING CRANK FOR SEAT
12"
12'-3" AIR TIRE 360° ROTATION
WITH 3" TIRE DEFLECTION
RIVETS' DETAIL DOUBLE SIZE
36½"
17"
8'-2"
15'-2"
7"
17"
2" 25"
10'-6"
7'-5"
WING'S SLOT
AILERON COMPRESSION RIB
TAG
AIR BRAKE
CROSS VIEW of RIB SECTION
SPARS
ANTI-DRAG WIRE
AILERON'S TORQUE ROD
HINGE COMPRESSION RIB
AIR BRAKE'S TORQUE ROD
NAVIGATION LIGHT
WING'S SLOT
END BRACE
ENGINE: WRIGHT "CYCLONE" R
SCALE:
DRAWN BY... W. A. WYLAM
CURTISS "STRIKE"
A-12
6"
7"
6'-8½"
MAX. WIDTH of WING
3"
2½"
55"
46"
44'-0"
8'-7"

Model Builder's Hall of Fame

VERNON BOEHLE

By PHILIP ZECCHITELLA

THERE is one thing we can remember about Vernon Boehle. Although present at practically all of the past National meets, in Dayton, New York, Atlantic City, Akron and St. Louis, he has never been very much in evidence except when the trophies were given out at the banquet. Briefly therefore, that is the essence of his aeronautical personality. Possessed with a rugged determination and a belief that the best man will win, Vernon can set his heart on something and in his own quiet manner get it, too. At last year's Nationals his one aim was to win the Moffett trophy. Why? Well in his own vernacular, "It was the best looking trophy in the bunch and I wanted to look at it for a year. I'm looking at it now."

Of course it wasn't all as easy as one might be led to believe, for Vernon's calculative powers were largely responsible for the victory. In the Moffett event the contestants are given three official qualifying flights and the highest six compete in the finals. There are only six contestants in actual competition for the Moffett trophy. On his first qualifying flight Vernon gave his model three quarters of its maximum turns as he was afraid he might lose it, and as one of the rules previous years has stated that the same model used to qualify must also fly in the finals, it was more or less important that the model be recovered. On the first flight it flew for two and one half minutes. His idea was to get the model up just long enough to become one of the six remaining entrants and without being lost, so on the next flight the model was wound a little more but with the prop so adjusted that it would come loose with part of the rubber strands and nose down, killing the glide. This arrangement worked so well that the model did a little over two minutes on the next flight. Vernon began to get worried! What he also did not know at the time was that it required at least a four minute flight to get into the finals. On the last flight he gave the motor all it would take figuring it better to lose the model than to get nowhere at all with it, and good thinking it was, too, for the model flew for twenty-eight and one half minutes and then out of sight. There now remained a little matter as what to use for the finals, but Lieut. Alden informed the boys it was no longer necessary to use the same ship, so Vernon flew one of his replacements and won the trophy!

Vernon is twenty summers ripe, lives in Indianapolis and started building model airplanes in 1929. That year might have some significance for there were undoubtedly many people who in 1929 found themselves suddenly with much spare time on their hands; but his activity, however, was prompted by a long prevailing interest in airplanes and airmen. His ambition today is still that of his childhood—a transport pilot's license.

His first model was a baby R.O.G. and

Vernon Boehle

when it actually took off, Vernon was in the throes of temporary insanity for ten seconds, his fervor at the performance of his model reducing his composure to nothing short of a daze. Little did he reckon what was to follow!

The latter part of that summer he entered his first contest in Indianapolis. He flew a tractor model and noted that most of the other entrys were twin pushers. As his best flight was twenty-two seconds, compared to the winning time of two and one-half minutes, he did not question the wide-spread use of twin pushers but wisely decided to build one himself for future outdoor competition. That winter he joined the Brookside Club of Indianapolis and for the first time saw an indoor flying model. At the next indoor meet he built his first indoor model and entered the contest. The model performed a series of climbs and stalls, and in a competitive sort of a way, it might be well admitted that Vernon's entry did not exactly knock them cold.

Vernon with one of his record models and trophies he has been awarded

By the time the third contest rolled around, he had sufficiently eliminated any defects in his models with the result that he won the meet with an accumulation of the most points. For this he was awarded a trophy, several airplane trips, and an all-expense trip to the National meet then at Dayton, Ohio. What a swell slogan they must have had, "Win Our Contest And See America First!" The first prize at the last National meet had been a trip to Europe. Victory and Vagabondia!

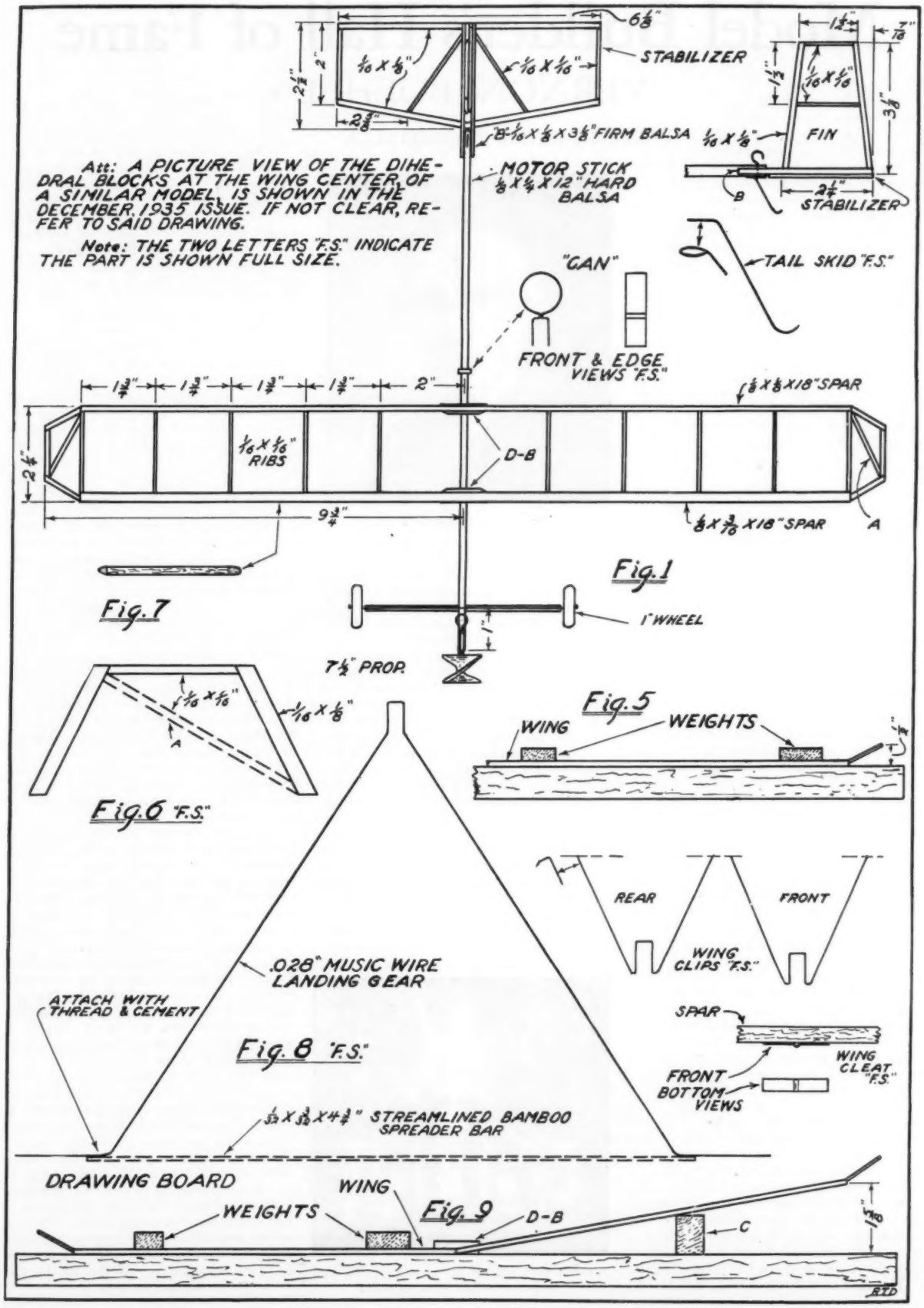
In the Nationals, Vernon won fifth place in the Mulvihill event and received a cash prize of thirty dollars. If Einstein had had as much success with the comparative amount of effort, relativity would probably be taught in grade schools in between the pages of two-and-two-make-four, and the Oil Lamps of China would now be cigarette lighters, but in any case, Vernon was certainly teasing the Law of Averages!

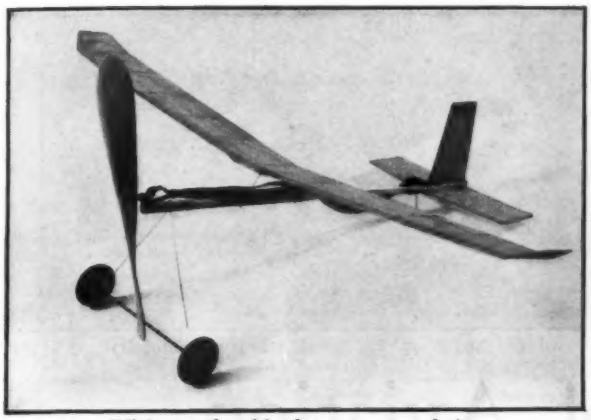
Accordingly, this meet instilled in him a determination to out-do himself at the next National meet which was to be held in Atlantic City. Vernon was to long remember the Atlantic City meet. In the Mulvihill event, his model got off to a good start but as it gained altitude Vernon noticed, that the timers were making no effort to keep it in sight. Excitedly, he looked up at his model and then back at the timers while in his mind he was trying to choose between homicide or a mad dash. After one look at his model way up in the blue, he broke out into the mad dash. After miles and miles of floating power and free-wheeling, the model disappeared from sight. Upon returning to the airport he discovered that the timers had been clocking another model by mistake.

His main objective at this meet however, was the Wakefield trophy. He had managed to get into the finals but while winding up his ship, the free-wheeler gave way wrecking completely the forward assembly of the craft. Vernon, at all times the essence of politeness, wasted no time on otherwise appropriate eulogy, but proceeded to repair his model instead. By the time he managed to get it back to normal, the currents had subsided and the model flew in a dead calm. A twin pusher saved the day and despite a wrecked elevator it flew long enough to net him third place.

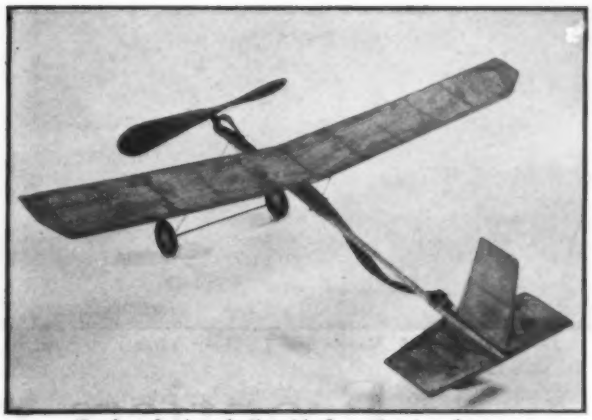
As far as the National meets go, Vernon admits they are the highest order of competition and attributes the current interest in model building to this annual event. To be sure, there are roughly fifty worthwhile prizes and at least three hundred contestants, which in terms of simple mathematics means that two hundred and fifty of them get nothing but a swell vacation out of the affair. To date we do not believe that Vernon has been enjoying the National meets from the vacation standpoint. All in all, he has

(Continued on page 34)


6⅛"
STABILIZER
1/16 X 1/16"
2½"
2"
2⅜"
1½"
7/16"
1⅛"
3⅛"
FIN
B-1/16 X ⅛ X 3⅛" FIRM BALSA
1/16 X ⅛"
MOTOR STICK
⅛ X ¼ X 12" HARD BALSA
B
2¼"
STABILIZER
Att: A PICTURE VIEW OF THE DIHEDRAL BLOCKS AT THE WING CENTER OF A SIMILAR MODEL IS SHOWN IN THE DECEMBER 1935 ISSUE. IF NOT CLEAR, REFER TO SAID DRAWING.
Note: THE TWO LETTERS "F.S." INDICATE THE PART IS SHOWN FULL SIZE.
TAIL SKID "F.S."
"CAN"
FRONT & EDGE VIEWS "F.S."
1¾" 1¾" 1¾" 1¾" 2"
⅛ X ⅛ X 18" SPAR
2¼"
1/16 X 1/16" RIBS
D-B
9¾"
⅛ X ⅜ X 18" SPAR
A
Fig. 1
Fig. 7
1" WHEEL
7½" PROP.
1/16 X 1/16"
1/16 X ⅛"
A
Fig. 6 "F.S."
Fig. 5
WING
WEIGHTS
REAR
FRONT
WING CLIPS "F.S."
.028" MUSIC WIRE LANDING GEAR
ATTACH WITH THREAD & CEMENT
Fig. 8 "F.S."
SPAR
WING CLEAT "F.S."
FRONT BOTTOM VIEWS
1/32 X 3/32 X 4¾" STREAMLINED BAMBOO SPREADER BAR
DRAWING BOARD
WING
WEIGHTS
Fig. 9
D-B
C
1½"
R.T.D.



Efficient and stable due to correct design



Cambered wings built with flat strips is a feature

A Test Model for Beginner or Expert

A Plane of Simple Construction That Will Give Remarkable Flights and Serve As a Means For Experimentation

By RALEIGH T. DANIEL

HERE is a model plane that will serve as an excellent experimental ship. Even the beginner should experience no serious difficulty in constructing and flying it.

The materials to build it will cost only a few cents. Several new construction features we feel will be of interest and well worth while to those in the advanced class. For instance the manner of fixing the dihedral angle at the wing center. Whereas the detail is very simple, it has worked out to be a most excellent procedure in practice, because of the rigidity afforded as well as minimizing the chance of the dihedral angle being thrown out of adjustment.

Those who have not yet become very proficient in model airplane work will probably have much better success with a flying model of this type than with a more advanced design. Do an accurate job of work and when adjusted for flight, you will have a machine that gives consistent and dependable performance.

Wing

It is suggested that you make a full-sized drawing of the wing and tail parts on a sheet of paper of ample size. Then attach the paper to a drawing board or similar surface. Using thumb tacks, secure the wing spars in place on the drawing. Cut the ribs to length and cement in place.

Make the wing tips as in figure 6. Attach them to the wing as shown and raise the outer end ½ inch, see Fig. 5. Do not put in the diagonal brace "A" until the tip framework is in place on the wing end. When the cement has thoroughly dried, the wing spars may be sanded to the shape shown in Fig. 7. This will help streamline the wing. Now cut the spars on the underside at the center, to a depth of about 1/3 of the spar thickness and crack them with the fingers so that the wing may assume the shape shown in Fig. 9. Slip the block "C" under one-half of the wing to raise the tip the correct amount; see Fig. 9. Cement in place the dihedral blocks "D-B," Fig. 9. These blocks measure 1/16 x 5/16 x 11/16", hard balsa. Allow the wing to thoroughly dry in this position and then take it up. Trim the blocks "D-B" until they are the same shape of the wing spars, looking from the front. Also see Fig. 1. Now give one or more coats of cement around the joints.

Make four (4) wing cleats from (.012") sheet aluminum according to the shape shown. These are attached to the wing spars on the underside, with thread and cement. The advantage of the cleat for an outdoor model lies in its ability to remain fastened on the spar, thus holding the clip securely in place, whereas in the old method of cementing the wire clips to the wing spars, they had a very bad habit of pulling off. And such a habit is very annoying to say the least.

When the cleats have been put on, cover the wing with tissue on the TOP SIDE ONLY. A strictly flat wing of the framework type will perform better when surfaced on the top side only, than if both top and bottom are covered.

Propeller

A machine-cut propeller has an advantage in that it will save a good deal of time. Get an 8 inch prop and cut ¼ inch off each end, thus reducing the diameter to 7½ inches. Finish the propeller off with sandpaper and balance it.

If desired, you may carve the propeller by hand. In that case, use a block of balsa measuring ⅝ x 1 x 7½ inches blanking it to the conventional "X" type.

Tail Units

After the stabilizer and fin have been made, the spars are sanded to streamlined shape as in the case of the wing, and the tips of the corners are rounded off. The fin is cemented to the inside of one of the tail boom members, see Fig. 1. Two wood blocks are used, one beside each spar of the fin, between it and the boom member "B" to fill out the space and hold the fin more rigid. Be sure that these joints and also where the tail boom members connect to the stabilizer, are cemented securely.

Cover the stabilizer on the top side. Cover the fin on both sides. The tail assembly is secured on the motor stick by wrapping with cotton twine only. Wrap firmly. Do not use thread as it is entirely unsatisfactory. Use the common, small, white cotton twine such as used by grocery and other retail stores.

This type of adjustable tail affords several interesting features of advantage, which allows worthwhile experimentation and can be of great value on certain types of models. It provides a lateral adjustment of the stabilizer with relation to the wing. By grasping the tail booms where they are bound to the motor stick, the setting can be made so that the fin will effect either right or left rudder. And of course the angle of incidence in the stabilizer can easily be set so as to have the proper relation

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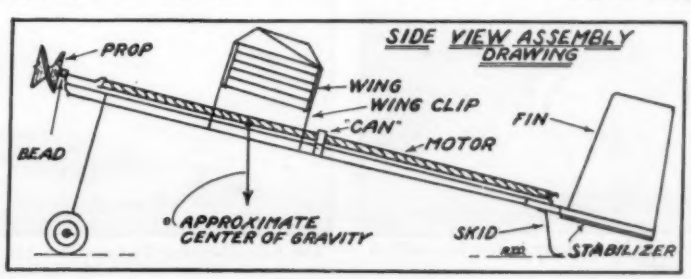
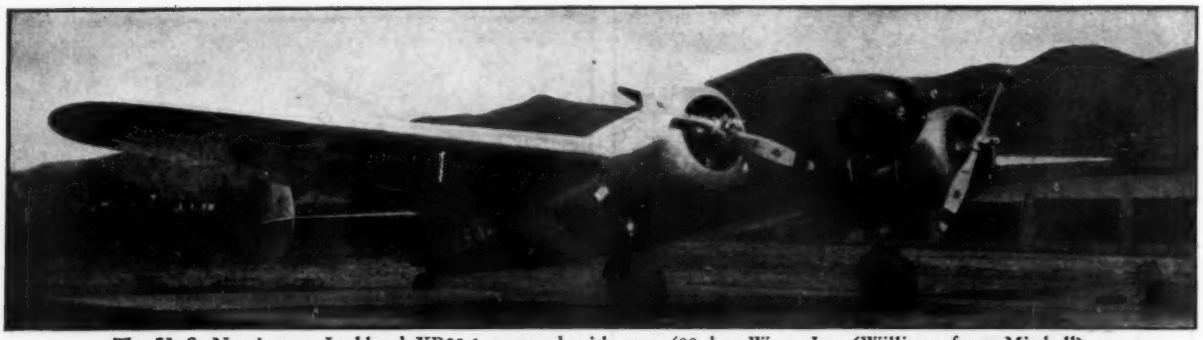




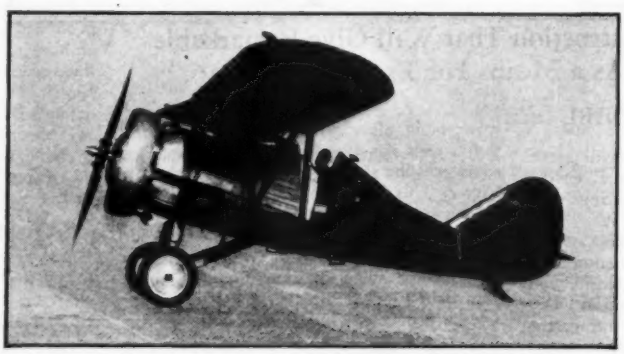
The U. S. Navy's new Lockheed XR20-1 powered with two 400 hp. Wasp Jrs. (Williams from Mitchell)

Frontiers of Aviation

Latest Developments Here and Abroad and What They Mean to Aviation—Scale Model of the Brown B-3

By ROBERT C. MORRISON

ONE of the surest signs that an aircraft company is prosperous is the announcement of an expansion in factory facilities. Not many months ago it was Consolidated who completed a new giant factory on the west coast. Then North American completed theirs, also on the west coast, with plans for further expansion at a later date if necessary. Sikorsky was next in line to announce the expansion of their already huge plant. The Sikorsky Company has an additional excuse for adding more floor space, not solely because they are overwhelmed with orders, but because their planes are so large that there is not enough roof area to cover them. Future Sikorsky flying-boats will be so large that they will perhaps have to be built out-of-doors in dry-docks like the steamships.



A rare picture of a Russian single-seater fighter. (Sovfoto)

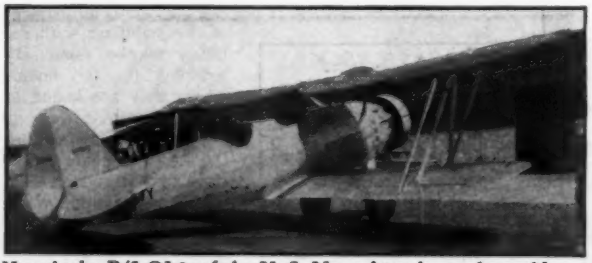
Next Curtiss-Wright came forth with the surprise announcement of a building program. For the past few years the company has been endeavoring to shrink from its profitless holdings scattered in all parts of the country. This having now been accomplished and their activities more or less centralized, the company is ready to do business on an even larger scale than they did prior to the depression With a twin-engined Army attack featuring a novel monospar wing construction at Dayton to depend on for an order from the Air Corps—another twin-engined ship at Anacostia trying to satisfy Navy officials in rigorous tests—there is much reason to believe that Curtiss-Wright is well on its way to the top.

The new Curtiss Navy job is a low-wing monoplane with enclosure for pilot and gunner. The plane is undoubtedly a development of the Curtiss Army attack ship and perhaps will compete against Northrop's pet bomber for a Navy order. Retractable landing gear and carrier-deck landing equipment are incorporated in the plane.

The U.S. Government recently ordered 512 Curtiss-Wright engines at a cost of $3,850,000. 432 of them are 1,000 hp. Cyclones, 104 for the Boeing 299 bombers and 328 for the Douglas bombers now on order. The remaining 80 engines will be of the 450 hp. Whirlwind type for trainers. Pratt & Whitney also received a government order for 200 twin-row Wasps to be used on Northrop attack planes now being built.

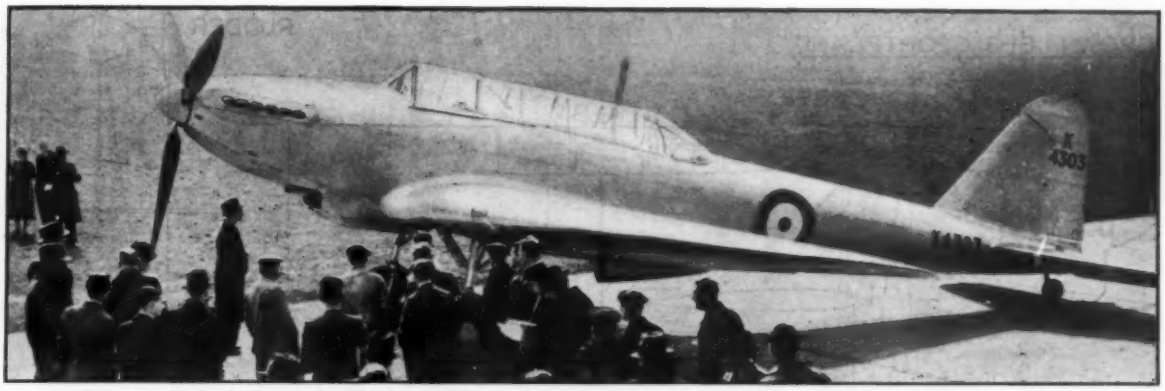
In Missouri, Curtiss-Wright is busy on ten new trainers ordered by a foreign government. They are a development of the famous Speed Wing and are powered by a 175 hp. engine.

At Grand Central Air Terminal a small concern was quietly working on five luxury sport planes when suddenly they were overwhelmed with an order for 31 attack planes for China. The company was none other than Vultee, a Cord subsidiary. At once it was announced that the company would move into a new factory at Downey, California, formerly used by the builders of the Emsco airplanes. Planes ordered: Vultee V-11 attacks. The factory is a two-story building well adapted for airplane manufacturing. With such a big order on hand it will mean that Vultee will be able to start a large development program and probably produce some new designs in the near future. Mr. Vultee has plans for a twin-engined sub-stratosphere transport which should be able to cross the continent in less than 10 hours.



Here is the B/J OJ-2, of the U. S. Navy, long in use but seldom seen

The Riley-Burrows Racer with a 120 hp. 4 cylinder in-line Glenn Martin engine



England's latest, the "Battle," a Fairey make, Rolls Royce powered bomber with 280 m.p.h. speed

Boeing has purchased a 28 acre tract of land on which they will begin at once to construct an extension of their present factory bordering Boeing Field. The company has just completed several P-26Cs for the Air Corps. They are a revamped version of the P-26A.

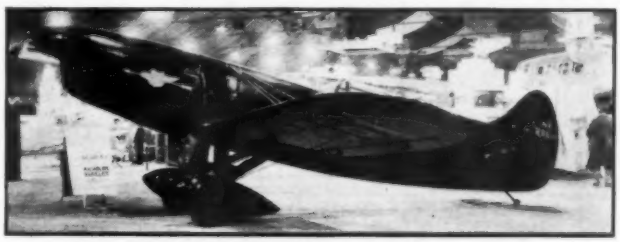
From abroad comes more news of England's future Short flying-boats. Completion of the first of the 29 boats ordered by Imperial Airways was scheduled for about May 1. Twenty-six of the flying-boats will be almost identical and will be flown between England and Australia. The other three, two composing the Mayo composite aircraft, will be expressly built for trans-Atlantic service.

Specifications of the planes follow:

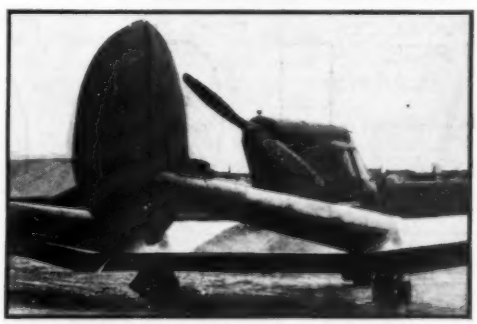
Wingspread—114' (Same as Sikorsky S-42)
Length overall—88½'
Gross load—17½ tons
Powered by four 920 hp. Bristol Pegasus X engines
Top speed—190 m.p.h.
Cruising speed—160 m.p.h.
Cruising range—750 miles
5 to 3½ tons payload
Hull cross-section—10' by 13'

One flying-boat will have about a 1,500 mile range and two others about 2,000 mile cruising ranges. The above figures are of course estimated by the company. DeHavilland-built Hamilton Standard propellers will be used on all boats.

From the appearance of models and drawings of the airliners, it seems that they will perform much higher than the estimated figures reveal. If not they would have performances equal or slightly less than our Sikorsky S-42s which does not seem logical since Short Brothers have had much more time to develop their ships. More than two years have passed since the completion of the first S-42. Then again British Marine Aircraft, Ltd., who now have many of the four-engined Sikorskys in process of construction threatens stiff competition with Short Brothers. Even our present S-42A and Martin Clippers which will compete with Imperial Airways rank slightly higher than the Shorts now building if the latter ships do not surpass estimated performances. It seems strange that Short Brothers did not try to go us one better in this present fight for flying-boat supremacy.



The new Brown B-3 sportplane with a 300 hp. Menasco engine. It has "slots" and "flaps." (Williams from Mitchell)



A rear view of the new Hammond. It carries 2 people with 95 hp. Note flaps. (Soibelman)

It would be difficult to beat the construction used in these boats. All-metal skin-stressed construction is used similar to the American practice coupled with the ideas of the English designers. There is no doubt that the four-engined giants are wonderful airplanes,and it is equally as wonderful that Imperial Airways should be able to order twenty-nine of them. The English government is interested in developing a military version of the new Short flying-boats.

England is coming forth with many new "mystery" military ships these months that should attract our attention. Most important at this writing is the Fairey Battle, a single-engined clean cut low-wing bomber. It is a very huge plane to be powered by only one engine but its swift lines makes it obvious that the plane is very fast. The power plant is the Rolls-Royce Merlin twelve-cylinder V-type engine of more than 1,000 hp. One excellent feature of this engine is its small frontal area. The Fairey Battle is of the same general design as the Vultee and Northrop attacks plus about ten feet more wingspread. Dimensions follow:

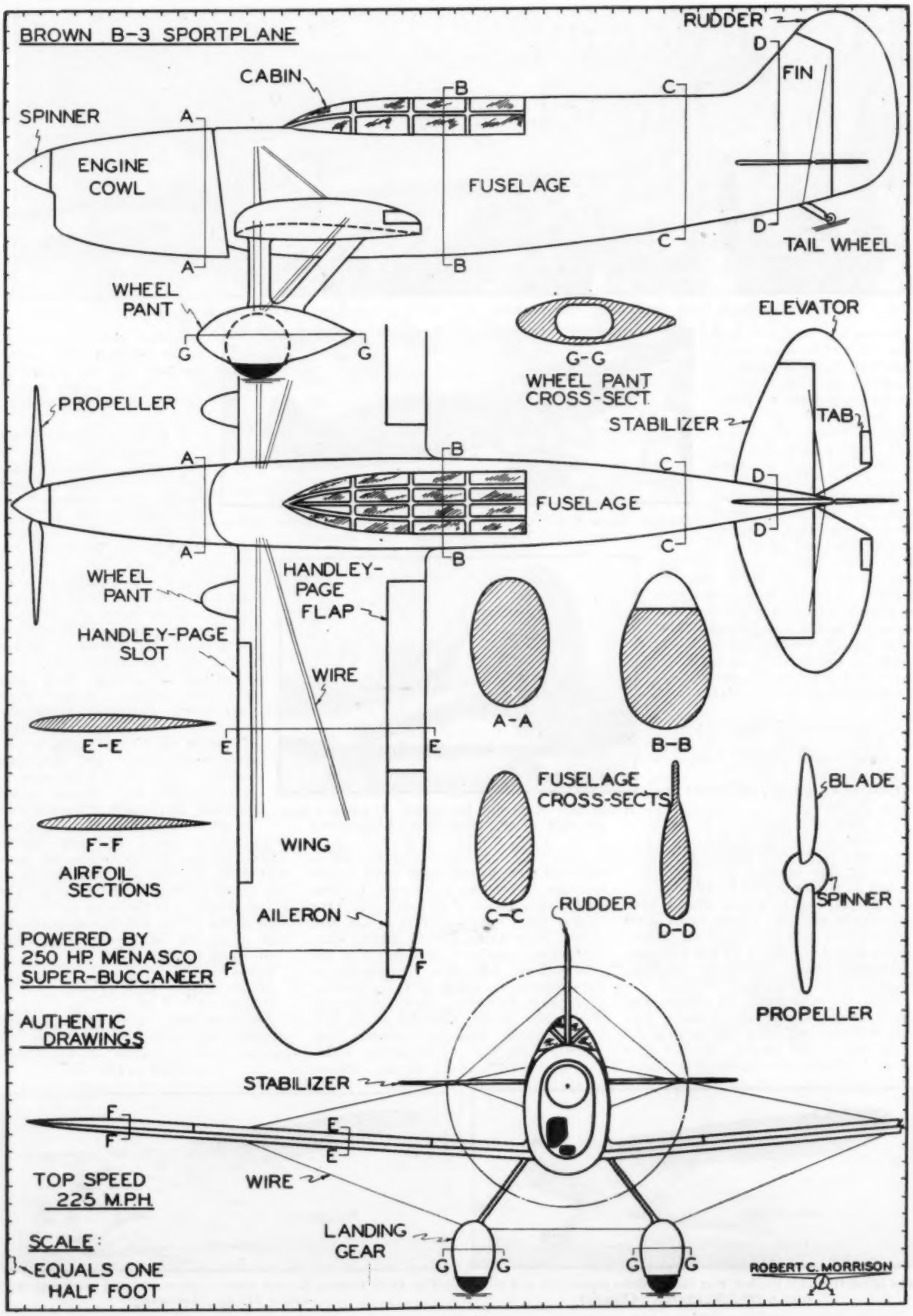
Span—54 ft.
Length overall—42 ft. 1¾ in.
Height—15 ft. 6 in.

The huge plane is of all-metal skin-stressed construction incorporating all modern features as flaps and retractable

(Continued on page 32)

The latest Howard, DGA-8, that carries three passengers and pilot with a 320 "Whirlwind." (Tenety)

The 1936 Stinson Reliant makes 150 m.p.h. and performs well with a 245 hp. "Lycoming"


BROWN B-3 SPORTPLANE
RUDDER
D
FIN
CABIN
B
C
SPINNER
A
ENGINE COWL
FUSELAGE
D
C
TAIL WHEEL
A
B
WHEEL PANT
G
G
G-G
WHEEL PANT CROSS-SECT
ELEVATOR
PROPELLER
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C-C
RUDDER
D-D
SPINNER
AILERON
POWERED BY 250 HP. MENASCO SUPER-BUCCANEER
F
F
PROPELLER
AUTHENTIC DRAWINGS
STABILIZER
F
F
E
E
TOP SPEED 225 M.P.H.
WIRE
SCALE:
EQUALS ONE HALF FOOT
LANDING GEAR
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ROBERT C. MORRISON

Proportioning Your Model for Stability

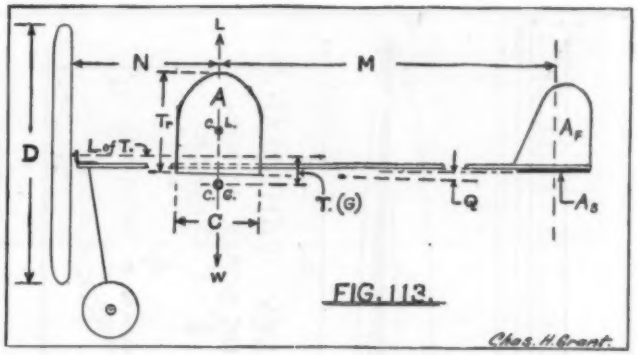


FIG. 113.

How to Design the Stabilizer and the Landing Gear in Order to Establish Longitudinal Stability and the Correct Position of the C. of G.

Article No. 52—Chapter No. 5

By CHARLES HAMPSON GRANT

ARTICLE No. 51 published in the June issue of MODEL AIRPLANE NEWS, explained how the correct amount of dihedral and fin area should be determined for our "stability" model in order to endow it with lateral and directional stability to a larger degree. It is now our concern to take the steps required to make it stable *longitudinally*. (For symbol references, see Fig. No. 113).

Longitudinal Stability

The chief factor that establishes the longitudinal stability of a model is the horizontal tail surface or stabilizer. This prevents the tail from rising or dropping suddenly out of its normal flight position and holds the plane steady on its course in a horizontal plane. As in the case of the fin, the distance from the center of gravity (Moment Arm) and the area of this horizontal surface have a great deal to do with the stability of the plane. On any given model, the longer the stabilizer moment arm and the greater its area, the more stable the plane will be longitudinally. If these factors are larger than are required for good performance, however, the heavier and less efficient the model will be in flight. The most desirable situation is to have them large enough but not too large.

Stabilizer Moment Arm

When the length of the moment arm is to be decided upon, it is advantageous to keep the purpose of the model in mind, for the general rule for the choice of a moment arm length will be modified one way or another by the purpose of the model. The *general rule* for determining its length is:—*Make the stabilizer moment arm* (the distance from the center of the wing to the center of the stabilizer) *equal to about one-half the wing span.* It is never advisable to make its length less than *two and one-half* times the average wing chord. Actually its moment arm length is influenced by the wing chord, not the wing span. However, because the fin moment arm length is usually equal to about one-half the wing span and it is convenient from a structural standpoint to put the stabilizer the same distance from the center of gravity as the fin, it is customary to determine its moment arm in terms of the span.

In the case of the "stability model" that we are designing here, the fin moment arm is thirteen inches. The wing chord is three inches. If the stabilizer moment arm is established as two and a half times the wing chord, it will be seven and a half inches. Thus if the stabilizer is placed so that its center is seven and a half inches to the rear of the center of the wing, it will be five and a half inches in front of the fin. This obviously would be a ridiculous arrangement; insomuch as the stabilizer could be placed directly under the fin and thereby enjoy the advantage of a long moment arm. With the stabilizer in such a position, it would have a moment arm of about thirteen inches, the same as the fin. This long moment arm will give exceptional longitudinal stability and will therefore satisfy all demands of a stability model.

Another distinct advantage of a long tail moment arm which has not been mentioned is that it insures a long fuselage and therefore a long motor with a capacity for many winds.

Stabilizer Area

The general rule for stabilizer area, given in Chapter No. 3 on Stability, is:—Make the area of the stabilizer one-third of the total wing area. This rule covers all types of planes in a general way and the model builder will not ever be very wrong in using it. However, to a certain degree the required area varies with different types of models. For the type being designed here, the approximate rule specifies that the stabilizer area be from thirty to thirty-five per cent of the wing area. If the wing is to be located well forward on the stick due to a heavy nosed ship, the value of thirty per cent will be sufficient. But always remember, too much will do no harm as far as stability is concerned. The value of thirty per cent can be taken safely for our "stability" plane.

All the values given for stabilizer area are based on a moment arm (M) of about one-half the wing span and a wing chord of one-seventh the span. In this case the moment arm is slightly longer than one-half the span and the chord is only one-eighth the span. Both of these conditions make the stabilizer more effective than in the average case, which means that less area may be used in this surface than the thirty per cent required in average cases; probably twenty-five per cent would not be too little. However, in order to have our model exceptionally stable, an area of thirty per cent of the wing area will be selected, considering the fact that we are using here the approximate method of estimation.

The most accurate method to use and probably the one that would be favored by advanced or uncompromising model builders is the method of calculating the stabilizer area by the formula given in Chapter No. 3. This takes into account all factors which influence the amount of stabilizer area required. It is as follows:

$$A_s = \left(\frac{D}{8}\right)\left(\frac{A}{3M}\right)\left(2C+N\right).$$

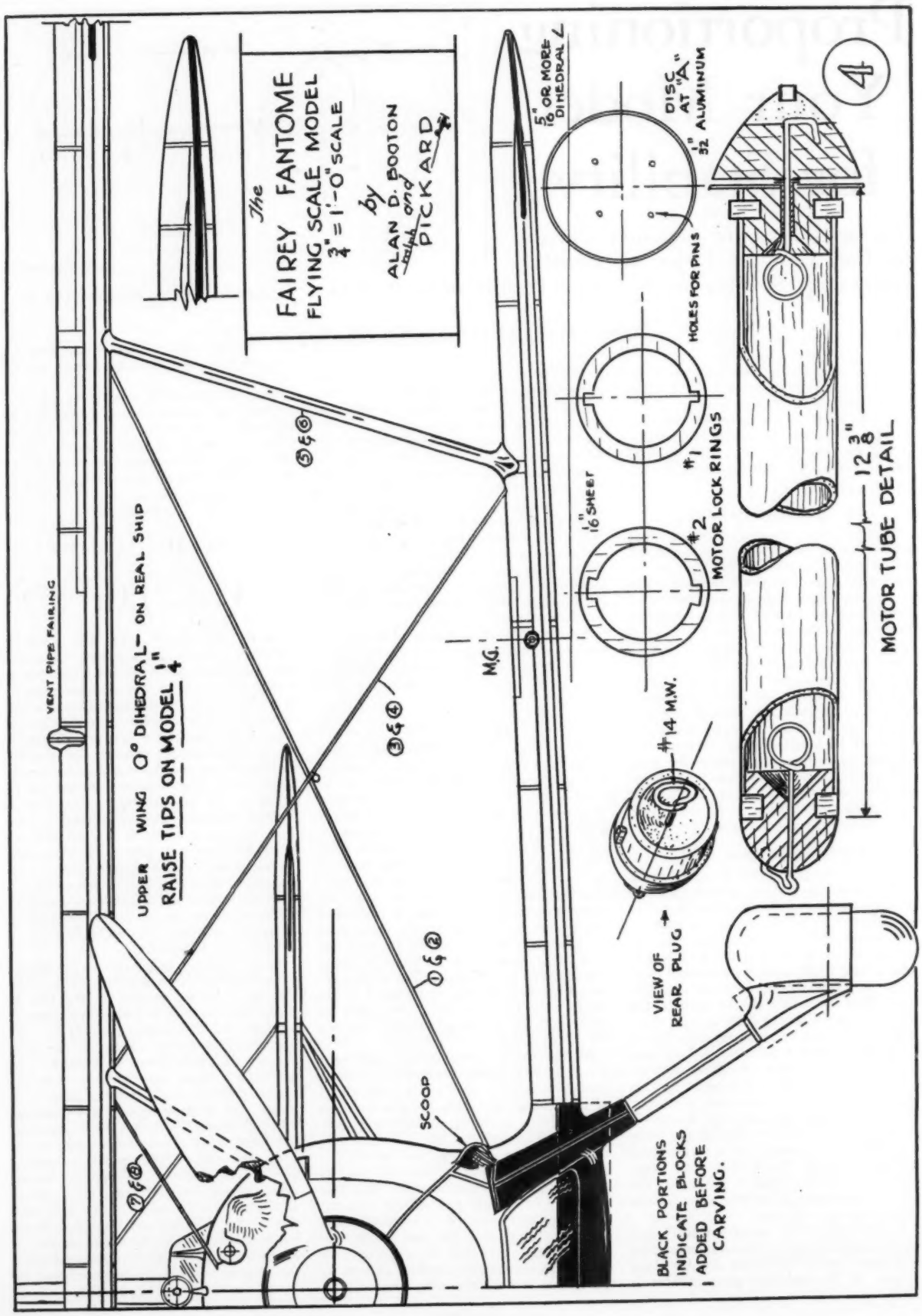
$$\left[1-\left(\frac{Q+\frac{2X}{M}-2}{5}\right)\right]\left(1-\frac{(G+2T)}{4C}\right).$$

In the formula, A_s = the required stabilizer area in square inches; D = the propeller diameter; A = the wing area in square inches; M = the stabilizer moment arm; C = the chord length of the wing; N = the distance from the center of the wing to the rear face of the propeller hub; Q = the difference in angle between the wing incidence and the stabilizer incidence; Z = the upward distance from the line of thrust to the wing center section when a normal dihedral angle one inch tip rise per foot of span is used; G = the distance from the center of gravity to the center section of the wing; T = the distance from the center of gravity to the line of thrust.

In the case of the model being designed, all these values are, or can be established, except the stabilizer area, to be determined. They are as follows:

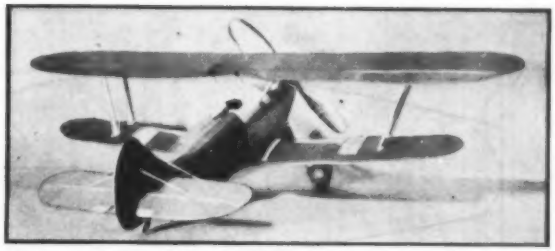
A = 70 square inches; M = 13 inches; C = 3 inches; N = 5 inches. The stabilizer is to be set parallel to the line of thrust and the wing is to have an angle of incidence of 2½ degrees, so Q = 2½ degrees. The center section of the wing is below the line of thrust so, normally (X) would be a minus quantity. However, excessive dihedral angle is to be used, (1¾ inches per foot of span). If a normal dihedral should be used without changing the location of the center of lift on the wing, the center section would be located very slightly above the line of thrust; approximately on the same line with it, so therefore, (X) = O. The exact position of the C.G. has not been determined, but in this type of model where stability is important, it is well to have it as far below the wing as possible. Its distance below the

(Continued on page 38)


The
FAIREY FANTOME
FLYING SCALE MODEL
3/4" = 1'-0" SCALE
by
ALAN D. BOOTON
and
PICKARD
4
UPPER WING 0° DIHEDRAL — ON REAL SHIP
RAISE TIPS ON MODEL 1/4"
VENT PIPE FAIRING
SCOOP
M.G.
#14 M.W.
VIEW OF REAR PLUG
BLACK PORTIONS INDICATE BLOCKS ADDED BEFORE CARVING.
5/16" OR MORE DIHEDRAL
DISC AT "A" 1/32" ALUMINUM
HOLES FOR PINS
#1
#2
MOTOR LOCK RINGS
1/16" SHEET
MOTOR TUBE DETAIL
12 3/8"

Build This Flying Fairey Fantome

How You Can Construct a Scale Model of a British War Plane That Has Fine Flying Qualities As Well As Looks



Refinements of detail makes this model one that you will be proud to own

By ALAN D. BOOTON and RALPH PICKARD

ONE of the newest and fastest multi-gun fighters, the Fantome was apparently designed for export, otherwise the secrets of its construction would not have been disclosed by the British. The Fantome boasts of four guns; two of which are mounted under the cowl in the usual place, and one in each lower wing. A 20 mm. rapid fire cannon is mounted between the banks of the "V" type motor and fires through the hub of the geared propeller. With a speed of 248 m.p.h. at 20,000 feet, it is believed to be the speediest of the multi-gun types. It is equipped for high altitudes and also has racks for light bombs.

The model presented has been faithfully reproduced in miniature and is capable of making flights of several hundred feet. Keep in mind, however, while building the model that even with the carved cowling, the tail must be devoid of any surplus weight and the nose may need a .1 or .2 oz. weight to get the final balance.

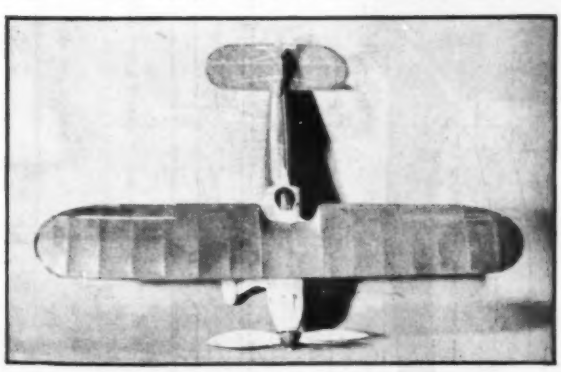
Wings

Just before starting the wings, cement the 2 main cowl blocks together in several spots and lay them aside to set. The wing ribs and tips are drawn full size on sheet 1 and the mid-portions of the wing frames are shown on the top view, sheets 2 and 3, but it is necessary to draw simple single line panels full size on which to assemble the parts. Make the top wing all together, including the ailerons and hinges, which are simply 1/8" x 3/8" thin aluminum strips inserted through the spars where preferred, twisted and cemented. When dry, the ailerons are workable when cut free at the trailing edge. Make two separate lower panels. Leave the M.G. covers and external parts until the model is ready to dope. Note the imitation of the retrospect mirror. Cover it with bright tinfoil after the model is finished and it will add to the appearance.

Cowl

Trace the top and side outlines of the cowl drawing on to the cemented blocks, using the joint as center for the top outline. Cut on a band-saw if possible, and then cement the bottom block on. Cut slots for the landing gear stubs and cement them in, referring to the angles on sheet 4, front view. It is suggested that 2 extra No. 5 ribs be cut and placed on the lower wing stub location to carve from and protect the stubs. Carve the cowl and use the templates on sheet 1 for reference. After carving, sand to a smooth finish. Cut through the center of the bottom block, then part the cowl blocks and hollow them out. Leave the wood about 1/4" thick at the nose, and taper to 1/16" to section C from which the 1/16" thickness continues to the rear of the block. (A sharp, spoon-shaped tool is ideal to hollow out with. Try it).

The finished model in full flight presents a most realistic appearance



How it looks from above

Fuselage

Use the side view drawing and assemble a right half fuselage. Prop the cowl up on pieces of 1/32" sheet, fasten 1/16" strips to the top and bottom outlines, and cement the right halves of the formers D and E in place. (Raising the cowl, as above, centers the cowl with the center of the 1/16" strips). Cement the fairing strips on, leaving the rear ends unattached to anything until both sides are complete. When dry, take the right side up and build the left to it.

Mix one level teaspoonful of flour to an ounce of banana liquid or model dope and rub it on the surface of the cowl with the index finger, a small space at a time. Dip finger in thinner if the mixture gets sticky before the smoothing is done. (This fills the grain and permits the use of only one coat of gloss dope). Refinish any unfilled spots and when dry, sand to a smooth finish. Scribe the panel lines with a pencil and length of straight cardboard, and punch the imitation screws in with a pencil point.

Tail Surfaces

Draw a simple outline of the whole stabilizer, sheet 3, and assemble as a unit, since it is stronger and easier to attach in this manner. The ribs are cemented in, in rectangular form on the rudder and stabilizer and are sanded to streamline shape after removing from board. Insert the stabilizer in between the fairing strips, in approximate final position on fuselage and cement the rudder in place. Now cement the stabilizer spar to the rudder post next to the top and block the leading edge to 0° incidence and cement. Floor the rear compartment with soft 1/16" sheet to fasten the stabilizer struts and tail skid to and then cement the loose ends of the fairing strips to the rudder post. To get a good job, cover the fuselage with small, fitted patterns of tissue. Add headrest, tail skid and struts at rear.

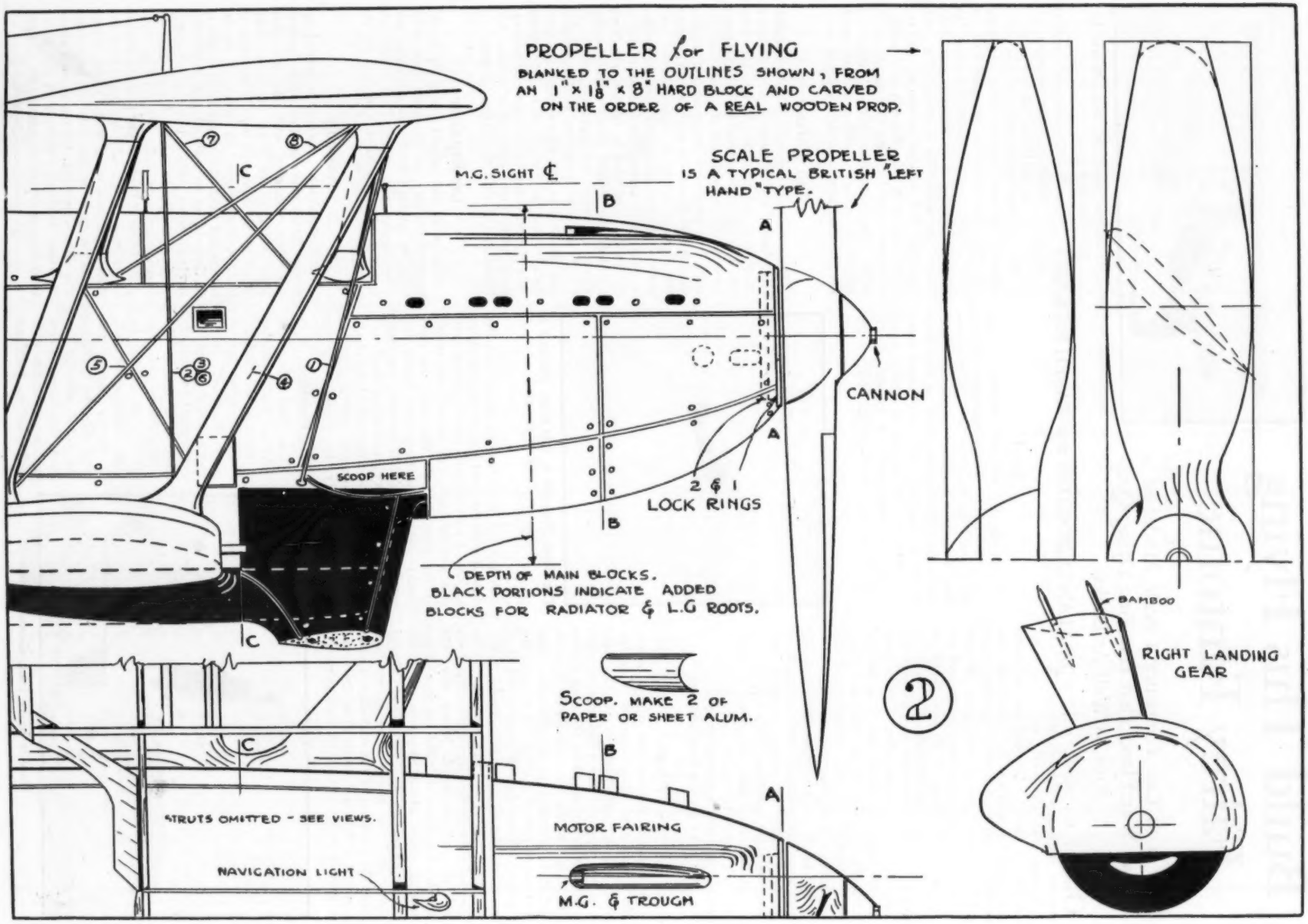
Landing Gear

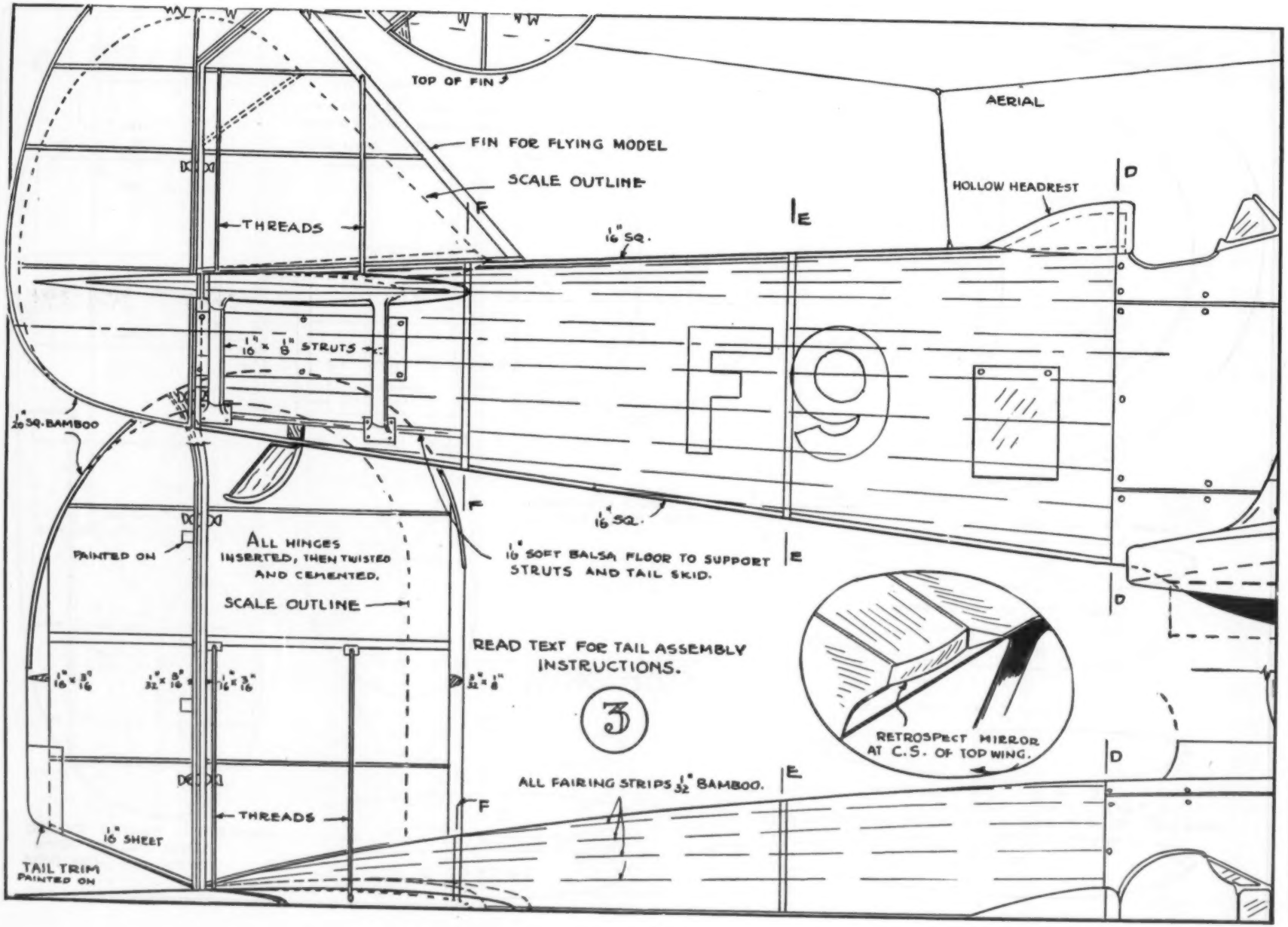
The pants and wheels are made in the conventional way, by cementing sheet balsa sides on hollowed cores. Add the struts and fillet blocks and carve. The wheels are 9/16" x 3/8" hard balsa. Cut pins for the axles.

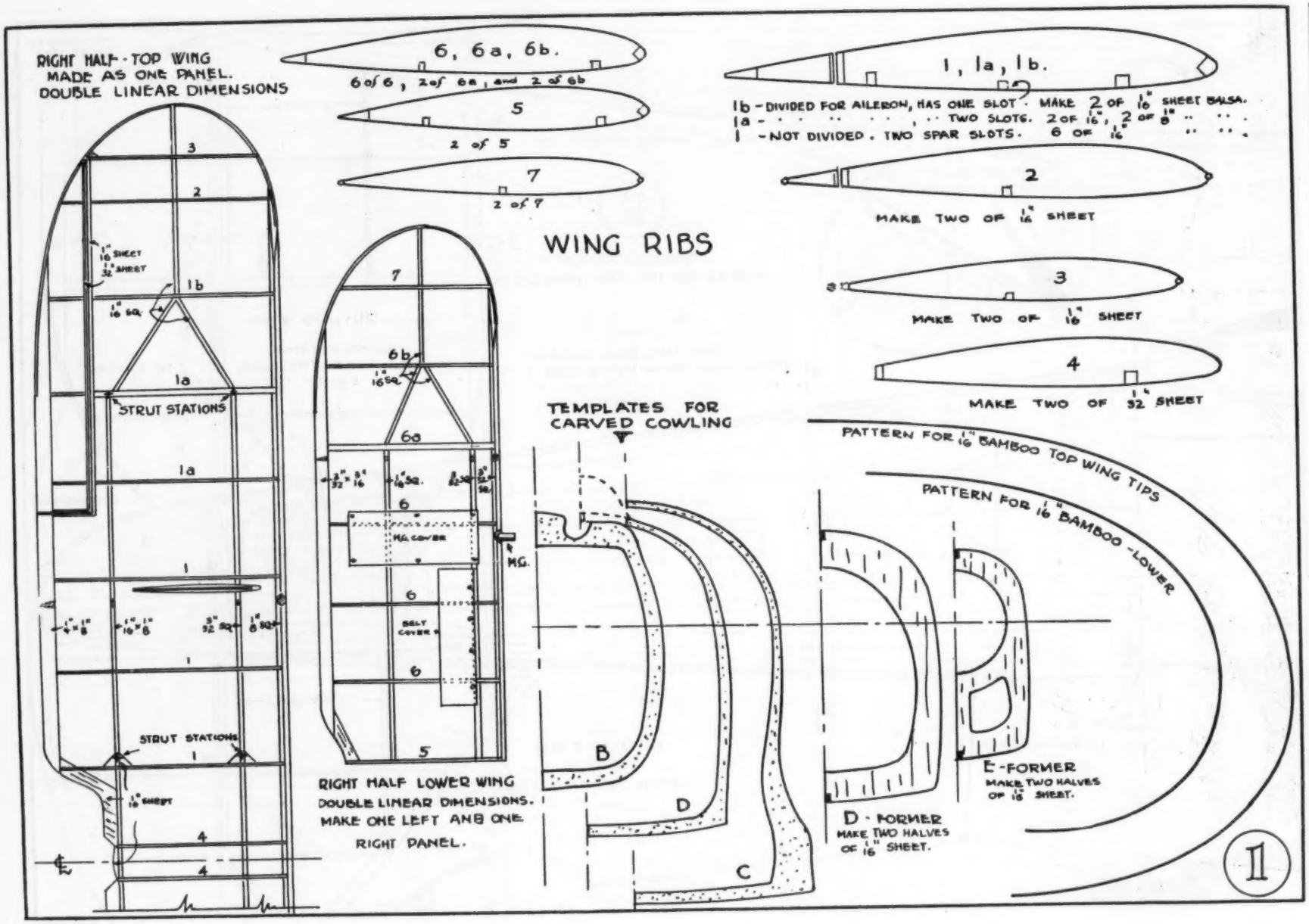
Assembly

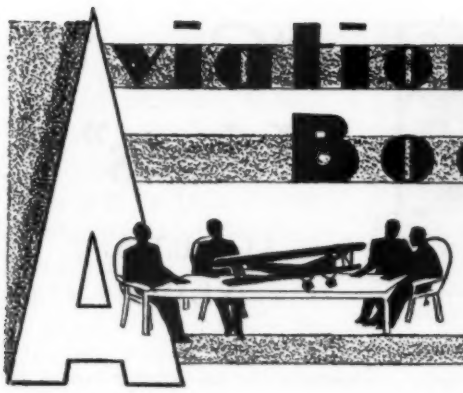
Block the fuselage firmly in neutral attitude. After covering the wings, cement the lower wings on with not less than 5/16" dihedral and block the upper wing which should have 1/4" built in dihedral, in position temporarily, in order to fit the cabane and interplane struts in. It is best to fit them in, so no patterns are given. The struts fillets are difficult to make and plenty of time should be taken. Three ways of filleting are suggested; (1) cut the struts to the angle of the fillet line and add thicker blocks and carve; (2) add blocks to the sides at the ends and carve; (3) use plastic wood you make or buy, after the struts are shaped to streamline. Do not cement struts to tissue, but cut a portion of the tissue away and cement to the ample ribs. Cement

(Continued on page 35)


PROPELLER for FLYING
BLANKED TO THE OUTLINES SHOWN, FROM AN 1" x 1⅛" x 8" HARD BLOCK AND CARVED ON THE ORDER OF A REAL WOODEN PROP.
SCALE PROPELLER IS A TYPICAL BRITISH "LEFT HAND" TYPE.
M.G. SIGHT ℄
CANNON
SCOOP HERE
2 & 1 LOCK RINGS
DEPTH OF MAIN BLOCKS. BLACK PORTIONS INDICATE ADDED BLOCKS FOR RADIATOR & L.G ROOTS.
SCOOP. MAKE 2 OF PAPER OR SHEET ALUM.
STRUTS OMITTED - SEE VIEWS.
NAVIGATION LIGHT
MOTOR FAIRING
M.G. & TROUGH
BAMBOO
RIGHT LANDING GEAR
2


TOP OF FIN
AERIAL
FIN FOR FLYING MODEL
SCALE OUTLINE
HOLLOW HEADREST
THREADS
1/16" SQ.
1/16" x 1/8" STRUTS
1/20" SQ. BAMBOO
F9
1/16" SQ.
PAINTED ON
ALL HINGES INSERTED, THEN TWISTED AND CEMENTED.
1/16" SOFT BALSA FLOOR TO SUPPORT STRUTS AND TAIL SKID.
SCALE OUTLINE
READ TEXT FOR TAIL ASSEMBLY INSTRUCTIONS.
3
RETROSPECT MIRROR AT C.S. OF TOP WING.
ALL FAIRING STRIPS 1/32" BAMBOO.
THREADS
1/16" SHEET
TAIL TRIM PAINTED ON


RIGHT HALF - TOP WING
MADE AS ONE PANEL.
DOUBLE LINEAR DIMENSIONS
6, 6a, 6b.
6 of 6, 2 of 6a, and 2 of 6b
5
2 of 5
7
2 of 7
1, 1a, 1b.
1b - DIVIDED FOR AILERON, HAS ONE SLOT. MAKE 2 OF 1/16 SHEET BALSA.
1a - " " " " , TWO SLOTS. 2 OF 1/16, 2 OF 1/8 " " "
1 - NOT DIVIDED. TWO SPAR SLOTS. 6 OF 1/16 " " "
2
MAKE TWO OF 1/16 SHEET
WING RIBS
3
MAKE TWO OF 1/16 SHEET
4
MAKE TWO OF 1/32 SHEET
1/16 SHEET
1/32 SHEET
1/16 SQ.
STRUT STATIONS
STRUT STATIONS
1/16 SHEET
RIGHT HALF LOWER WING
DOUBLE LINEAR DIMENSIONS.
MAKE ONE LEFT AND ONE
RIGHT PANEL.
TEMPLATES FOR
CARVED COWLING
MG.
MG. COVER
BELT COVER
B
D
C
PATTERN FOR 1/16 BAMBOO TOP WING TIPS
PATTERN FOR 1/16 BAMBOO - LOWER
D - FORMER
MAKE TWO HALVES
OF 1/16 SHEET.
E - FORMER
MAKE TWO HALVES
OF 1/16 SHEET.
11



Aviation Advisory Board

Conducted by
CHARLES HAMPSON GRANT
Chairman of the Board
Formerly of
The Technical Section, Air Service, U.S. Army

THEY say that "knowledge is the basis of power." It is, therefore, with the greatest of pleasure that we undertake to increase the aviation knowledge by answering the following questions from our readers.

Ronny Scholze of 1209 Victoria Avenue, New Kensington, Pa., is particularly interested in twin pushers. He says:

"I am building a pusher model that has a forty inch wingspan and is thirty-nine inches in length."

Question: How should I find the center of gravity of this model and adjust it properly for flying? Is there any particular thing I should remember when trying to fly pushers; such as propeller torque and position of the wing and stabilizer?

Answer: The center of gravity of a pusher may be found very easily by balancing it on the sharp edge of a ruler. The ruler should extend across and underneath the frame, perpendicular to the flight path of the machine. The point of balance is the center of gravity.

It is unnecessary to determine the center of gravity before the machine is designed, inasmuch as in the case of a pusher, the wings may be readily moved along the frame to give the proper balance to the plane, regardless of the position of the center of gravity. In this case we are speaking of orthodox pushers, not the "freak" or unusual variety.

In order to get the best flight from a pusher the following points should be considered:

The area of the stabilizer should be between twenty-five and forty per cent of the area of the main wing. The elevator or front plane should have an angle of incidence which is two degrees greater than the angle of incidence of the rear or main plane. A greater amount of difference in angle between the two wings will cause excessive climb and extreme diving tendencies.

Usually best results can be obtained when the diameter of each propeller is approximately thirty to thirty-three per cent of the wing span, if the pusher is a "twin."

In twin pushers there is no propeller torque inasmuch as two propellers are used which turn in opposite directions. The torque of one balances the torque of the other. Of course, in single propeller pushers, this condition does not exist and the torque is usually quite excessive.

As a rule the distance between the center of gravity and the stabilizer is about two and a half to three times the distance from the center of gravity to the center of the main wing.

Murray Ellins of 230 Pickering Street, Toronto, Ontario, Canada, wishes to know the following:

Question: What is a cantilever wing? He refers particularly to the word "cantilever."

Answer: A cantilever wing is a wing which is supported at one point only. In other words, the wing extends out in either direction from the fuselage; the point of support being at the fuselage without any supporting struts extending from the fuselage to any other point in the wing.

Owen Deters of 1251 Rutledge Avenue, Cincinnati, Ohio, asks the following questions, which should be of considerable interest to many builders.

Question: What is the center of lateral area? How is it determined?

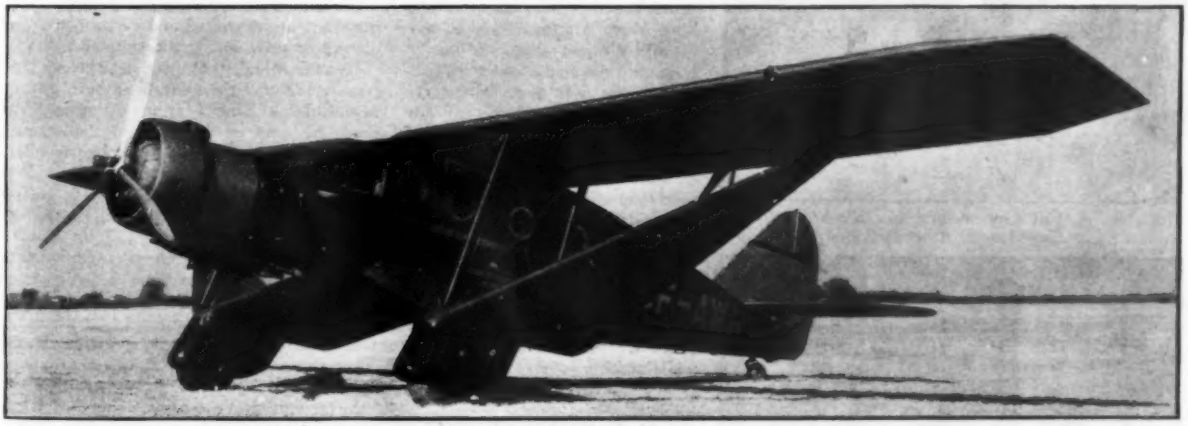
Answer: The center of lateral area is that point at which the effect of side air pressure on an airplane is concentrated. It may be determined by cutting out a silhouette of the side view of an airplane, including all the parts such as the wing dihedral, landing gear and the propeller.

Then suspend the silhouette by a thread at the end of which a pin is tied. This is done by sticking the pin into the cardboard silhouette at various places which you feel the center of lateral area may be located. When the correct position has been found the cardboard silhouette will balance perfectly in a horizontal plane. Be sure the pin is forced into the cardboard in a vertical position.

Question: What effect does the position of the center of lateral area have on the flight of a gas model?

Answer: If the position of the center of lateral area is forward of the center of gravity, the gas model, or any model, will

(Continued on page 46)



The latest version of the Bellanca Aircruiser Cargo Landplane. Its weight empty is 6115 pounds and it carries 4021 pounds of cargo. Loaded it weighs 11,400. The high speed at 7000 ft. is 165 m.p.h. while it cruises at 155 m.p.h. The flying range is 1000 miles. The wing span is 65 ft. and it is powered by a Wright Cyclone 1820-F-3 of 715 hp. at 6900 ft. altitude. The body is of steel tubing fabric covered. The wings have spruce spars, steel ribs, and fabric covering

"Gas Lines"

I.G.M.A.A. NEWS

Pict. No. 6. Gas jobs on the "line" at a recent contest at Los Angeles, Cal.; by Maclin Benagh, Jr.

WE HAVE some great news for you this month. The first International Gas Model Airplane Association Contest has just been held with the greatest of success. Some readers may not be familiar with this Association and its purpose. This is an association of gas model airplane builders, organized for the purpose of getting together all gas model airplane enthusiasts. The organization was started about four months ago and its membership has increased since that time with leaps and bounds, until it is now in the neighborhood of 600 members.

Pict. No. 1. Gerard Smith makes ready his hydro gas model for a flight in Prospect Park, Brooklyn

Pict. No. 2. C. J. Ruhland (right) with assistant, George E. Serviss, and plane in which he tested the motor he designed

Pict. No. 4. Bill Gowan and his KG-3 which he praises for flight consistency

Pict. No. 9. Peter Butrus and his scale Monocoupe

This column, "Gas Lines," is devoted to information concerning all members of the I.G.M.A.A. Each month its members are given the latest news of gas model airplane activities. The general purpose of the organization is to promote gas model flying and to keep its members in touch with the latest developments in this field. It also encourages activity within its various units and gives any information necessary to run contests or to promote the art.

Now for the big news. Let your imagination take you to Hadley Airport in New Brunswick, New Jersey, early in the morning of Saturday, May 9th. This is the day for the first big International Gas Model Airplane Association Contest. The day has dawned clear but with the sun beating down through the deadly still air, giving promise of thermals and long flights later in the day. The Contest Director, Mr. Nathan Polk, and the Director of the Association, Mr. Charles Grant, together with the recorder, Miss Mary Matlaga, and an assistant, William Ying, are busily arranging the equipment at 8 A.M. A few cars with a varied assortment of gas jobs are already arriving. These are assigned to a special parking place out of range of gas models that may make poor take offs; the runway of several widths of roofing paper being located at a point distant from the automobile parking place. At the center of the field the judges' tables and the weighing-in tables are located. Back of these is the space where fliers may assemble while waiting to have their models weighed in and a timer assigned to them.

Behind this model parking place a rope is stretched across the field to keep back over-enthusiastic spectators. All the equipment is arranged and things are ready to proceed. By 9 A.M. a considerable crowd has collected back of the rope, staring in wonder at the many forms of models which are receiving the last "touches" before being weighed in. Many contestants have already been registered. However, more builders are arriving and registering continues for about three hours.

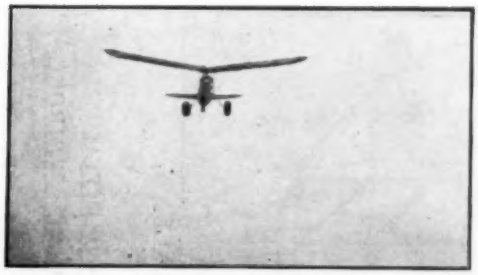
At the far end of the field small groups of fliers are busily testing their models for balance, making short test hops. Along the road on the other side, cars are arriving with each succeeding minute. Many of them have been delayed, having come from distant points. Washington, Wilmington, Albany, Atlantic City, Philadelphia, and many places in Pennsylvania are all represented among the contestants. Besides these many visitors are arriving with each instant, in spite of the interest shown by many in the "Hindenburg" which arrived at Lakehurst the same morning.

By noon the meet is in full swing, models taking off the runway with precision and regularity, one after the other. Each contestant who is flying his ship has had a timer assigned to him. Each timer's intense gaze follows the little ship as it soars upward until finally it comes to rest at some distant point, or disappears in the clouds. By this time about four hundred automobiles have assembled bringing the crowd to about fifteen hundred people. Special officers have been assigned to keep the crowd back of the ropes and out of the way of spinning props and fragile tail pieces. Their enthusiasm on many ocasions, due to intense excitement upon a vividly realistic crash, cause some, especially the youngsters, to make a mad dash across the field. These, however, are corralled and restrained from danger or mischief by the state troopers.

By this time the air has become intensely hot and thermals have been generated. John Ginetti from Atlantic City sends his ship up for a flight that causes spectators to gaze in open-mouthed wonder. They would have been more amazed if they had realized that only 1/16 oz. of fuel per pound of weight of the model was used for official flights. John's model finally disappears in a cloud, after a number of minutes in the air. The directors were on the point of congratulating him when he springs the sad news that the flight was unofficial, merely a practice flight. This was sad indeed for it was the longest flight of the day up to that time. Diligent efforts were made to trace the model but as yet no news has been heard of it. Thus, one of the best models on the field was unable to register any official time in the meet.

It is hard to imagine the thrill of such a

Full Details of the First International Gas Model Airplane Association Contest—Bassett Wins Trophy—Interesting Comments of Members From Various Parts of the World



Pict. No. 7. Jack Schwartz's parasol in full flight shows unusual steadiness and stability

Pict. No. 11. Frank C. Smith, Jr., and his "Calif. Chief" powered with a "Cyclone"

contest unless you have actually witnessed one. The roar of the tiny engines warming up and keen enthusiasm among the contestants tends to whet the interest of the crowd. There is plenty to see. Ships of every description are assembled; big and small, monoplanes, biplanes, high-wings, low-wings, beautifully made ships and "crates." Strange to say, however, fine flights are not confined to the beautifully made ships; for there is a distinct difference between the art of construction and the art of design. Some young men are craftsmen but lack the knowledge of aerodynamics to make fine flying ships. Then there are others who are so interested in the theories of aerodynamics involved that they have little patience to complete a refined job structurally. Unquestionably the latter are more successful, regardless of the looks of their planes.

During the contest many hearts are broken by occasional crashes. One ship holding the attention by a series of acrobatic gyrations loses its wings at an altitude of three hundred feet when it comes out of a steep zoom. The results are most realistic and take some of the old-timers back to days "on the front" during the World War. The model drops straight down and hits the earth with an impact that spreads it out in all directions.

On several of the long flights Mr. Gill Rob Wilson, the Aviation Commissioner of the State of New Jersey, was kind enough to follow the ships in his airplane. Mr. Wilson is a keen aviation enthusiast of long experience in this field. Many of the contestants enjoyed discussing aeronautical problems with him while he was at the contest. Members and officials of the International Gas Model Airplane Association wish to extend their heartiest appreciation for his co-operation in contributing to its success.

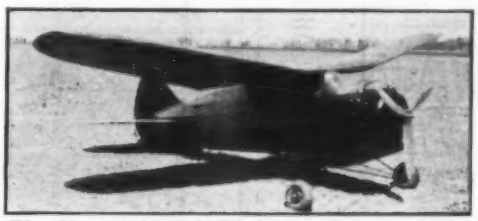
The contest continued uninterruptedly until five o'clock, the attention of the spectators being held as intensively by the activities as at any large airplane "circus" ever staged. Many could not get over seeing the amazing feat of an eight foot model airplane flying like a big ship without a pilot. At the end of the contest, at five o'clock, examination of the records disclosed that there were one hundred fifteen contestants present and about one hundred sixty or seventy gas models. This was the largest assemblage of gas model contestants and models ever staged. The next contest on record was only about half this size. Other interesting facts were also disclosed.

Maxwell Bassett of Philadelphia won the contest with a flight of 24 minutes, 18 seconds, using 1/16 oz. of gas per pound of weight of his model. For this he received the I.G.M.A.A. gold-bronze trophy which goes to the holder of the duration record of the I.G.M.A.A. He also received a Forster Brothers 1/3 hp. engine. Bassett, as many will remember, was the one who really started the hobby of gas model airplane building and flying in this country. He has been a consistent winner in all contests he has entered. His home is at 11th Street and 66th Avenue, Philadelphia, Pa. Being 21 years of age, Bassett's flight established an open class record under the National Aeronautic Association rules, the meet being sanctioned by this organization. The former record was held by Jesse Bieberman of Philadelphia, whose duration time was 22 minutes, 51 seconds.

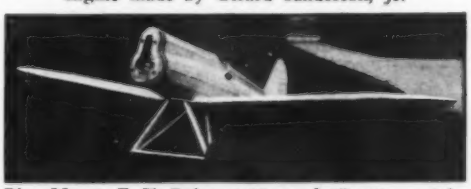
Second place was won by Walter Dickerson, 17 years old, of 129 Badger Avenue, Newark, New Jersey, with a flight of 9 minutes, 18 seconds. He received a Hurleman engine and a gold medal. The other contestants placed as follows:

William Dombert, age 16, of 64-03 Madison Street, Ridgewood, New York, with a flight of 6 minutes, 53 seconds, placed third. Fred Knoll, 19, of 137 Woodmere Blvd., Woodmere, New York, was fourth with a 6 minute, 45 seconds, flight. Carl W. Thompson Jr., 21, of 345 Y.M.C.A., Wilmington, Delaware, was fifth with a flight of 6 minutes. Sixth place went to Stephen Kowalik, 23, of 412 South Heald Street, Wilmington, Delaware, with a flight of 5 minutes, 55 seconds. Seventh place was won by Bob Long, 18, of 209 Greenwich Street, Reading, Pa., with a 5 minute, 45 seconds flight. Julius Gottlieb, 16, of 532 Palisade Avenue, Jersey City, N. J., was eighth with a flight of 5 minutes, 30 4/5 seconds. Ninth place was won by a group of three boys called the "C.S.S. Team" with a flight of 5 minutes, 30 1/5 seconds. The boys composing this team were Edward P. Stender, 26, of 205 Valley Brook Avenue, Roland V. Salvatore, 23, 181 Fontine Avenue, and Shenwood R. Castles, 23, 221 Fontine Avenue; all from Lyndhurst, New Jersey. Michael Granieri was tenth with a flight of 5 minutes, 10 seconds. Granieri is 16 years old and lives at 696 South 15th Street, Newark, New Jersey. Winners of third through

(Continued on page 40)

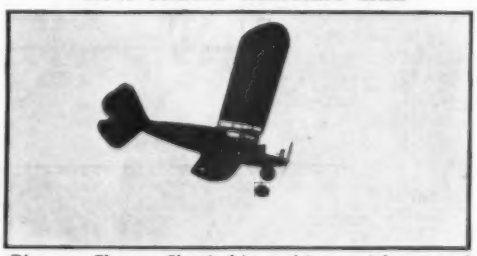


Pict. No. 3. A gas job that boasts of a two cylinder engine made by Girard Sanderson, Jr.



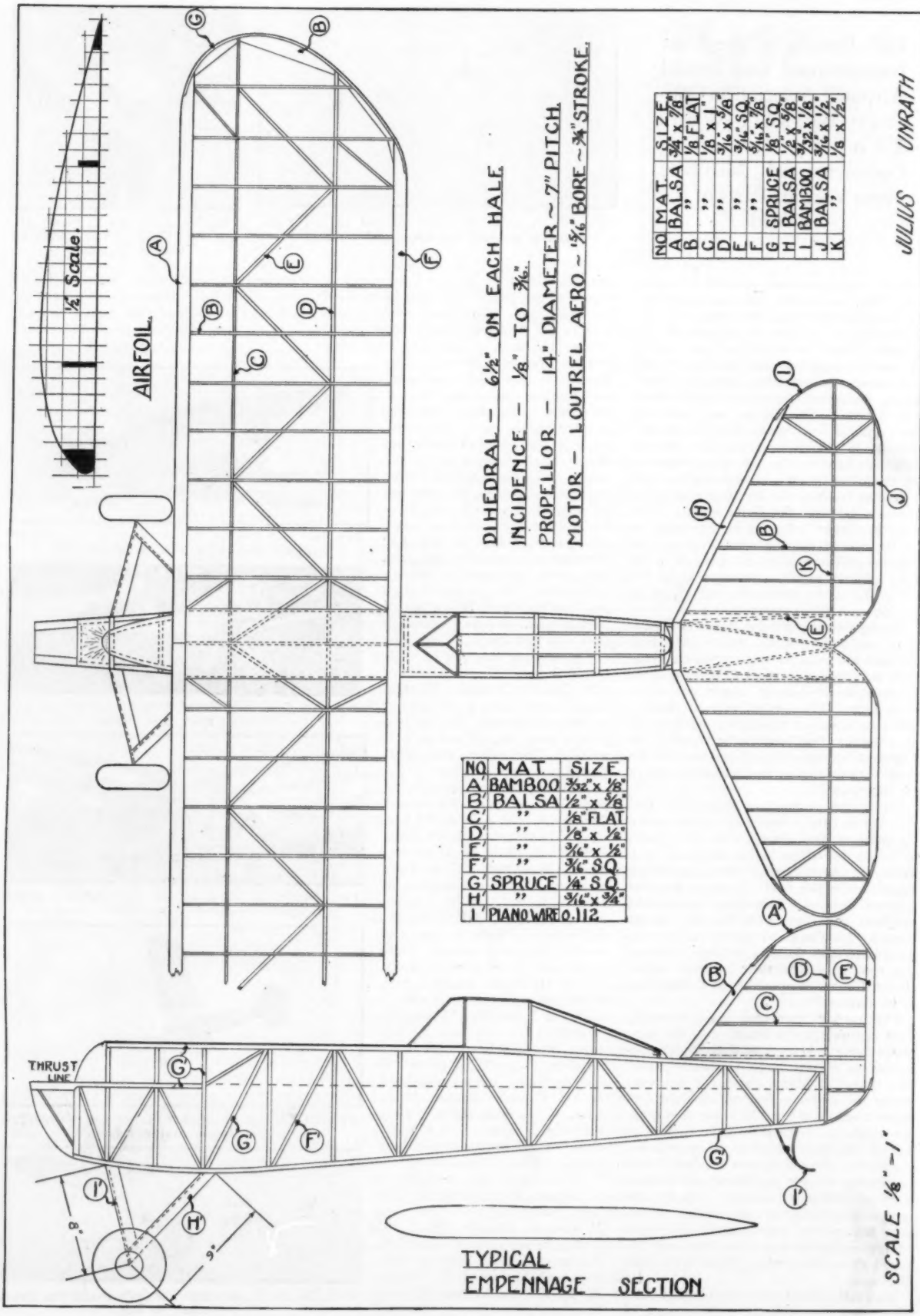
Pict. No. 5. F. T. Roberts' Howard "Pete" gas job. It has a span of 80 inches

Pict. No. 8. A "close up" of Paul Zakim's model shows beautiful construction detail



Pict. 10. Chester Chaplaskie's cabin gas job snapped while gliding in for a landing

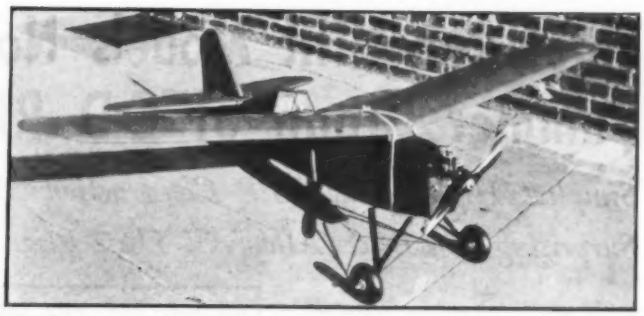
Pict. No. 12. T. Jennings Tinsley's model has flown five hours, 40 min.


½" Scale.
AIRFOIL.
DIHEDRAL — 6½" ON EACH HALF.
INCIDENCE — ⅛" TO 3/16".
PROPELLOR — 14" DIAMETER ~ 7" PITCH.
MOTOR — LOUTREL AERO ~ 15/16" BORE ~ ¾" STROKE.
JULIUS UNRATH
NO MAT. SIZE
A BALSA ¾" x 7/8"
B " ⅛" FLAT
C " ⅛" x 1"
D " 3/16" x ⅜"
E " 3/16" SQ.
F " 3/16" x ⅜"
G SPRUCE ⅛" SQ.
H BALSA ½" x ⅝"
J BAMBOO 3/32" x ⅛"
J BALSA 3/16" x ½"
K " ⅛" x ½"
NO MAT SIZE
A' BAMBOO 3/32" x ⅛"
B' BALSA ½" x ⅝"
C' " ⅛" FLAT
D' " ⅛" x ½"
E' " 3/16" x ½"
F' " 3/16" SQ.
G' SPRUCE ¼" SQ.
H' " 3/16" x ¾"
I' PIANO WIRE 0.112
THRUST LINE
8"
9"
SCALE ⅛" = 1"
TYPICAL EMPENNAGE SECTION

The "Sportster" Gas Model

Plans and Suggestions That Will Enable You to Build a Simple But Fine Flying Gas Engine Model

DUPLICATED FROM THE ORIGINAL DRAWINGS AND DATA THROUGH THE COURTESY OF LOUIS P. LOUTREL



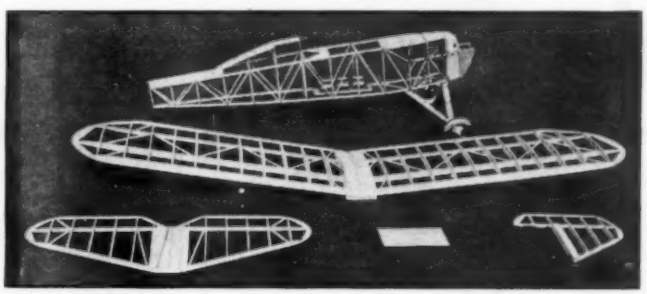
The finished model, a steady flier powered by a G.H.Q.-Loutrel engine

By JULIUS UNRATH

THIS model was test-flown in Van Cortlandt Park, New York, in April, 1935. When we reached the field it was fairly calm but had started to rain. By the time everything was in readiness, the model was "plenty wet." However, we decided to fly it or "bust" (the model). Just then it was suggested that I adjust the rudder so that the model would circle. I was sorry later that I hadn't used a little thought before setting that rudder.

The motor started easily and we released the model with a prayer on our lips. After bouncing over the ground for about fifty feet the model started to lift. When it reached an altitude of six inches a gust of wind got under the wing and lifted the model to about twenty feet. At that altitude it started to "sizzle" around in an honest-to-goodness vertical bank. Right then and there I thanked my lucky stars that I had used the small rudder.

If it hadn't been for that, the rudder would have caused the model to "flip" over on its side and dive into the ground. As it was it came down a little too fast for comfort. It made a three point landing (a wing tip, one wheel and stabilizer tip) which nearly caused our collapse. After almost having his nose cut off by the propeller, my "grease-monkey" cut the switch. Inventory of the damage amounted to a very dirty and muddy wing tip and a splintered landing gear fairing. The "Sportster" was again adjusted, this time with the rudder straight for we realized that the torque would cause the model to circle. The model then made its first successful flight; four minutes with 3/16 oz. of gas.



The uncovered parts of the model are simple but strong

After being completely recovered and fitted with "air wheels" the "Sportster" was taken to the Eastern States meet at Hadley field. Here we learned the model circled on the "take-off" WHICH caused it to fly into the crowd that gathered around the runway. One of the enthusiasts sat or jumped (I couldn't tell which) on the model and tore half the cabin away and about a square foot of paper off the wing. In spite of this, we carried the model to the roadway, called a timer and with ½ oz. of gas in the tank, released the "Sportster" on its longest flight to date. The motor "cut out" about five minutes after the take-off. Thirteen minutes and fifty seconds later after following the model in a car, we saw it land safely in front of a farmhouse. That day the "Sportster" was flown more

(Continued on page 34)

Ways and Means of Gas Model Success

Suggestions from an Expert That Will Help to Eliminate Your Crack-ups and Increase Flight Duration

By JOSEPH KOVEL

ALTHOUGH building and flying airplane models, powered by rubber motors, has long been a hobby interesting enough to attract a host of enthusiastic followers, it really wasn't until the midget gasoline motor made its bow that this activity came into its own. Fellows who expect to take up aviation as a career, either in the mechanical or engineering end of the game, can take advantage of the similarity between gas models and the big ships. The problems involved in the design of these models are the same as those of man-carrying ships, and it is possible to test theories and principles inexpensively yet accurately by means of the gas model.

The scientific aspect of the gas model, however, is not its only attraction. Many fellows who like to putter around with things that require a certain amount of craftsmanship, find gas model building an interesting and enjoyable pastime. You'll find them attending contests, not only to fly their ships, but also to discuss the latest wrinkles in the game and to exchange news and views with other "fans." Flying these miniature airplanes is quite a sport—and here's a tip to track coaches. If you need some good cross-country material, and you know of some fellows in your school who have gas models, you'll want to buttonhole them some afternoon and invite them to try for the cross-country team. Anyone who has had the experience of chasing a fast-disappearing model over hill and dale, through forests and streams, will appreciate what wonderful training this is for cross-country running. (Ask the writer. He knows!!)

The first motor suitable for model work was designed and perfected by Bill Brown, Jr., of Philadelphia. Maxwell Bassett, also of Philadelphia, introduced the first gas model, powered by the now famous "Brown Jr.," motor. The first flights of this model, at the 1932 "Nationals" at Atlantic City, N.J., were viewed with great interest, mixed with a bit of skepticism, by the other contestants. However, when the ship took 4th place in the Wakefield event with a flight of 2 min. 55 sec., the fellows "sat up and took notice." Bassett absolutely and completely stole the show at the 1933 "Nationals," held at Roosevelt Field, L. I., when he captured first place with his gas model in each of the four events he entered. This performance proved conclusively that gas models were in a class by themselves, and should not be allowed to compete against rubber-powered ships. Accordingly, the contest committee of the N.A.A. created a special event for models powered by "internal combustion engines."

At the 1934 Eastern States meet, held at Newark Airport, N.J., there were eight entries in this event, only two of the models

(Continued on page 29)

Three New Hit Models Now Added to this Big Swift Summer Group of C-D REPS and DWARF Thorough

Simplest High Grade REP Construction Methods Enable You to Build C-D's Quicker a

Surprising Low Prices Allow All These Prize Winning Models to be Made at Little Expens

RYAN SPORTSTER ST

This beautiful little two place job is well known to model-builders everywhere and our model looks as pretty as does the prototype. Span of course 20", suggested coloring, all silver, like the prototype. Model stable and fast. Kit R-58 complete (except liquids), postfree, only **50c**

C-D

"You have the best engineered plans I ever saw."—SALT LAKE CITY.

C-D

HUGHES RACER

Silver and blue model of the 350 m.p.h. super-speed flyer—nearest approach yet to a rocket ship. Retractable landing gear. Kit R-54, complete (except liquids), postfree, only..... **75c**

C-D

Special Limited Offer: Complete Set of 7 Issues, CLEVELAND MODELMAKING NEWS, only $1.50. Act quick. No. 7 now 25c.

C-D

CLEVELAND AMPHIBION

An experimental "Rep." Span 27". Twin Motored Sikorsky-like in lines. Will R.O.W. beautifully. Graceful flights. Kit R-X5001, complete (except liquids), postfree, only..... **60c**

C-D

"Been building models 8 years and never have seen the equal of yours."—PHILA.

C-D

FAMOUS FOKKER D-7 FIGHTER

This actual 20" model photo is almost a twin in looks to the photo of our ¾" model. Be sure to get it. Kit R-15, excellent flight, complete (except liquids), postfree, only..... **50c**

All C-D 20" Kits Include:

Full size, detailed mechanical drawings—bulkheads, etc., drawn out for repairs. All wood printed out. Finished scale wood wheels. Fine turned cowl front or drilled nose supplied. Fine bearing button. Finished balsa prop. Real model airplane rubber. Real celluloid for windshields. All strip wood of the finest quality accurately cut to size. White Japanese covering tissue. Insignia and wing lettering supplied printed out. Wire, washers, etc., etc.—Absolutely everything needed (even scale prop material, always omitted by others) except the liquids.

GRUMMAN F2F-1 FIGHTER

Latest Navy fighting ship, still on secret list. Big wing area makes model splendid flyer. Drawings cover both retracted or extended landing gear. Kit R-53, complete (except liquids), postfree, only **50c**

C-D

"Have been building C-D models for about 2½ years, and have never seen any that could equal yours. Bought a $2.00 Curtiss Goshawk about a year ago, and recently your 85c Goshawk. The $2.00 one looks like 30c compared to your 85c model. C-D's take off, fly, and land just like their prototypes."—MENANDS, N.Y.

C-D

CURTISS HAWK P6-E FIGHTER

Hard to tell this actual 20" model photo from our ¾" model. Full of typical C-D authentic features and details. Speedy flights. Kit R-21, complete (except liquids), postfree, only..... **50c**

C-D

"As a beginner, I appreciate Cleveland Kits for their fine material and supplies. And it was due to the completeness of the mechanical drawings which came with each of your Kits that enabled me to turn out my first job with great success. A beginner is fortunate if he orders from Cleveland first."—CARMICHAELS, PA.

C-D

CLEVELAND PIRATE BOMBER

An experimental "Rep." Span 28". Resembles Keystone Army Bomber. Fast, steady, long flights—twin motored. Kit R-X5002, complete (except liquids), postfree, only..... **60c**

HAWKER LOW WING FIGHTER

England's latest interceptor fighter. Sleek fuselage, plenty of area, a very swift flying model. Landing gear fully retractable as on the prototype, coloring suggested, all silver; insignia supplied. Kit R-57, complete (except liquids), postfree only..... **50c**

C-D

If you send us the names and type of stores (such as department, sporting goods, hardware, etc.) of three good reliable model dealers in your town, whom you have asked and who don't handle C-D Kits, we'll send you a surprise gift.

C-D

GREAT LAKES SPORT TRAINER 2T1-E

This famous design was formerly the flag ship of the C-D fleet—the ship that changed almost every known standard in the model aircraft industry. The Kit originally sold for $5.50, and being such an excellent flyer with so many requests that we bring back this beautiful number, we have done so; and to show the extra quality in the present day C-D designs, this number is now being sold for 50c and is legitimately priced. The model is almost identical with the older design, with but few minor exceptions, and the changes are really improvements, so that you can see that we are selling better models at 50c today than we did a few years ago at $5.50—at 1/11th the price! And the old Kit didn't even include printed out wood, yet it was a superb bargain at the time (from '29 to '32). This will show our present ¾" scale model value (SF-1 Great Lakes Sport Trainer, Model 2T1-F) even at $2.65 is several times better in general design and a far better bargain than what we sold originally at $5.50. This fine flying model Kit, another experimental "REP" Kit (yes, it's ¾" scale, too—do you want more?), suggested coloring, orange and black. Kit No. R-X5003, Span 26", complete (except liquids) only..... **50c**

C-D

"MR. MULLIGAN"

This really is a swell flyer—and a typical C-D authentically detailed job. In big demand—better hurry. Kit R-52, complete (except liquids), postfree, only **50c**

C-D

Better plan on coming to the Great Lakes Expo this summer on Cleveland's beautiful lake front. Hope to see a lot of our long distance friends on hand. Make our Hobby Store your "West Side" headquarters—no factory visitors, though. Sign the visitors' register.

Contrary to the usu practi weak, flimsy mate for hooks," Cleveland ies a little) of really qua each Kit to make a stron you buy C-D's, you satis greets!

CONSOLIDAT A-1

(Formerly P-30). blu beauty—and a "w for f of detail. Movab machi prop, radio mast, etc. contests will be this this model. Kit com (except liquids), ree,

"I have been deal with panies for some ti and I satisfied yet. I feel tha you will be a re. money order for $2 the —WASHINGTON, P.S well satisfied.

Read Bel Ord

Try your dealer f If he you want, order enc or money order— t you No C.O.D.'s. ment name and addr Canad British Isles cus add other countries, 2 Send plete C-D catalog

...vit Flying ...ughbreds!

...ker and Better;

...ens. Buy Now!

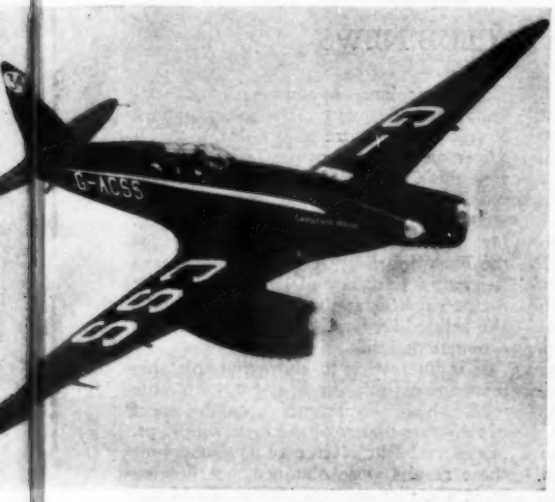
DWARF KITS contain everything EXCEPT LIQUIDS

Absolutely everything needed to build these beautiful models is included in each Kit, except liquids. No liquids are supplied with C-D Dwarf Kits. Models when finished will look precisely like those illustrated here.

C-D

"I still say Cleveland puts out the best models money can buy."—COLLEGE PARK, MD.

C-D



...use practice of supplying ...mate... for making "Sky ...and ...ties plenty (not just ...ally ... quality material in ...e a ... strong model. When ...you... satisfaction, not re-

...DAT... A-11 ATTACK

...-30)... blue and yellow ...-"w... for flights. Loads ...ovab... machine gun, scale ...ast, ... etc. Many flying ...be ... this summer with ...Kit ..., complete ...s), ...ree, only.... **40c**

...deal with different com... ...e ti... I've never been ...I feel ... that dealing with ... a ... I'm enclosing ...or $2... the following—." ...TON, C. P.S. And be was

...Bel... Ordering

...ler ... If he hasn't what ...rder ... enclosing check ...der— ...t your own risk. ...s. ... mention dealer's ...addr... Canada, Mexico, ...cus... —add 10%; all ...ies, 2... Send 3c for com... ...talog

De Havilland Comet (Dwarf)

The above photograph clearly brings out the elegant beauty of this all red powerful, and fast flying De Havilland Comet Dwarf model, which is very beautifully and deftly trimmed in white with silver propellers and spinners. Wheels are fully retractable. Model creates an imposing sight in flight with both men carefully carved and placed in the cockpit as should be done with these beautiful Dwarf (as well as our SF) models. The prototype won the Mac Robertson 11,300 mile England to Australia race in 71 hours. The model has a span of 22" and is an unbelievably beautiful little design, leaving little to be desired and at the ridiculously low price for such a high quality model, no model builder should pass up this design to be added to his fleet, regardless of what models he is interested in. If entirely "filled in" and wings and tail surfaces covered over with balsa, it may be kept indefinitely on display as a memento of your flying model days, either for home, office or store. Complete Kit, but no liquids, Kit D-51, postfree, only..... **85c**

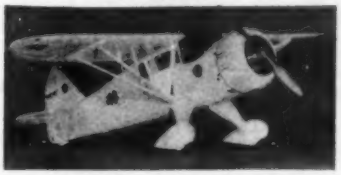
C-D

Model shown above and the 8 to the right are all exact ½" scale flying models (DWARFS); those to the left are all 20" and larger REPS for flights, yet far finer for display than any competitive models on the market.

C-D

If you haven't yet sent for your copy of the new large Cleveland Hobby catalog, send 10c (coin or stamps) for it right away. It's to be a corker! Ready late this summer.

C-D



"MISTER MULLIGAN"

Thompson Winner of '35, after Turner was forced down. Realistic takeoff; fine steady, fast flying model. Nothing compares with it in elaborate completeness—opening door, gadgets, etc. Span 15¾". Kit D52, complete except NO LIQUIDS, postfree only..... **50c**

C-D

"I've attended several model events, and could pick out the C-D's very readily. I think they're the most realistic and accurately engineered models of any I've ever seen."—SPRINGFIELD, ILL.

C-D

SOPWITH SE-5

Large biplane model. Excellent flyer. Span 13¾". Suggested coloring: Natural cream color. Kit D-9, complete (except liquids)..... **40c**

BISHOP'S NIEUPORT

Pride of Canada's ace, who assisted in our redesigning. Span 13¼". Suggested coloring: Silver and blue. Kit D-12, complete (except liquids)..... **50c**

C-D

DOOLITTLE'S LAIRD SUPER SOLUTION

Authentically redesigned. Recommended for both flights and exhibitions. Span 10⅝". Suggested coloring: yellow and green. Kit D-5, complete (except liquids), only..... **50c**

FOKKER D-VIII FIGHTER

The "flying razor" designed by Anthony Fokker. Very efficient fighting plane. Span 13⅝". Suggested coloring: cream and blue. Kit D-34, complete (except liquids), only..... **45c**

C-D

"Your materials are far superior to any I have obtained elsewhere, and as for your Kits, they cannot be approached. Your dwarf models are the finest small models on the market, and are fine flyers."—BROOKLYN, N.Y.

C-D

CURTISS CHINA HAWK

Make either the Turkey or China Hawk. These models incorporate all of the latest C-D construction features as the D-49 but the difference in external appearance offers interesting variety. This model is a favorite among fine model builders. Very fantastically decorated. Span 15¾". Suggested coloring: silver with red and white trim. Kit D-50, complete (except liquids)..... **85c**

DE HAVILLAND-4 BATTLE-PLANE

The famous U. S. Two Place Fighter-Bomber sent to France, powered with the famous Liberty engine. Extremely interesting to build. Dozens of fine details authentically duplicated. Span 21¼". Suggested coloring: olive drab, black and white checkered trim. Kit D-3, complete (except liquids) only..... **75c**

C-D

"Have already made four C-D models, and I don't think that out of a collection of 27 models, all made by myself, that there are any that look or fly better than these four C-D's."—ROCHESTER, N.Y.

C-D

For Dealers Only!

Dealers who do not handle the C-D line are losing money every day. Every month many dollars of business slips away from dealers and comes rushing in direct to us—because model-builders insist on having C-D's. Once you put in the C-D line, word quickly spreads, and before long you've got a steady, growing business coming in REGULARLY! Try it.

C-D

One dealer writes: "Please reply in full detail, as your ad gives me confidence in your line, that it will sell." To which a chorus of other dealers shout, "We'll say!"

C-D

Another: "I want to commend you on the immediate attention given our order. We received the kits in half the time other concerns take to send orders to us."

C-D

A report from one of our field men: "This dealer says, had he known these new Rep 20" Kits were so good, he'd have bought long ago, instead of loading up on a less valuable and less attractive line as he did."

C-D

C-D's are the fastest selling, best repeating line of flying models in America. Price range to suit all purses—and only one quality throughout. Write or wire for full details immediately. Clubs and Schools—Write for Club Notes!

ALL EUROPEAN DEALERS NOTE!

Communicate with our European Factory Representative: H. Vilen, Nybrokajen 7, Stockholm C, Sweden. Attractive territories still available. Regular full factory discounts allowed. European factory Stock Depot will give you quickest deliveries, 24 hour service, at no extra cost.

RICKENBACKER'S SPAD XIII

Col. Eddie Rickenbacker flew to fame in the Spad during the war. Most of his twenty-six victories were fought in it. It was fast and maneuverable, as is the model. Redesigned drawing is authentic as possible to make it, well detailed. Span 13½". Suggested coloring: Yellow and green. Kit D-13, complete (except liquids)..... **50c**

C-D

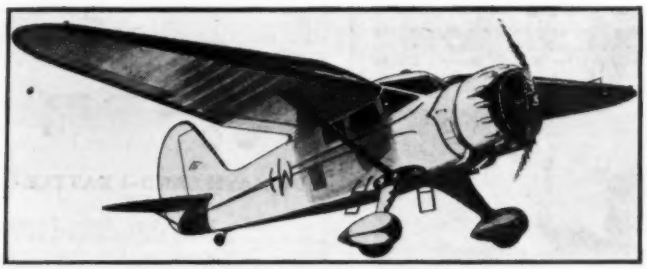
"Your Kits are absolutely the best I've ever seen."—MAYNARD, MASS.

It pays to get Cleveland quality not only in your Kits, but in all your parts and supplies, too. If your dealer can't supply you with genuine C-D Kits, or parts and supplies, order direct from us, mentioning your model dealer's name and address.

Be Sure to See Our Back Cover Ad Too!

Cleveland Model & Supply Co., Inc.

1866N West 57th St., *"Designers of Master Models Since 1919—Now Everything for Practical Hobbies."* Cleveland, Ohio, U.S.A.



The 1936 Stinson Taper-Wing

AIR WAYS
HERE AND THERE

What Readers Are Doing to Increase Their Knowledge of Aviation in All Parts of the World. Send Pictures and Details of Your Experiments

AIR WAYS CLUB NEWS

GREETINGS, Air Ways Club members. Many of you have sent in very fine groups of pictures of your model activities this month. However, there are many past contributors of Air Ways who have not as yet become members of the organization. The membership now stands at about 350.

Harland C. Wood of Middleton, Mass., starts us off this month with a very excellent drawing of the newest Gull Wing Stinson, which decorates the head of our column. As usual, Wood's presentation is flawless. We wish to thank him for his contribution.

In picture No. 1 Jack Dettis of 54 Bellanca Avenue, Pittsburgh, Pa., "crashes through" with an excellent picture of his Boeing F4B-4. This model was made by Dettis to order for a customer. In order to display the model covered and uncovered, Dettis covered the left half of the ship and left the framework of the right half exposed so the details of construction could be seen. The wing span is about fifteen inches. The whole ship is built to a half inch to the foot scale. The model is now on display in a downtown Pittsburgh department store.

Harold Sherwood of 116 East Oak Avenue, Wildwood, New Jersey, one of our good Air Ways Club members, honors us with a presentation of picture No. 2, a Douglas O-38, built to a three-quarter inch to a foot scale. All details are included in its construction; such as, movable controls, radio antenna that can be reeled into the cockpit on a spool, complete radio set, and other details too numerous to mention. The ship won first place at a local contest, getting the owner $25 in cash. This is one of the finest jobs we have seen. Congratulations, Mr. Sherwood.

Here we have a combination of originality and quality, shown in picture No. 3. The picture shows Mr. Fred J. Rogerson's biplane contest model, which won the Canadian Wakefield event last year. The time was one minute, twelve seconds, with only 720 turns on the motor. Mr. Rogerson is Technical Advisor of the Hamilton Branch of the Model Aero League of Canada and lives at 10 Locke Street North, Hamilton, Ontario, Canada. We salute him for the production of such a unique design.

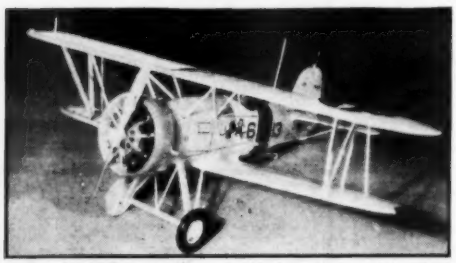
It is interesting to know that this ship flew successfully in a twenty-two mile wind which permanently grounded most of the other planes of the high wing type. Many model builders may not know how these results were obtained, but judging from the picture, your editor would say because the center of lateral area, or directional center, and the center of gravity were approximately on the same horizontal line. This makes for a very steady ship.

One of the old but most unusual airplanes ever produced was the Ford Trimotor. Evidently Lloyd Gabriel of Sault Ste. Marie, Michigan, General Delivery, recognizes this fact, for he has built a very excellent model of one, which is shown in picture No. 4. It has been built accurately to scale in all details except the propeller. A gear pulley transmission is employed to make the three propellers useful. It may surprise you to hear that this power system propels this model at a fast pace, though it has a large wing area. Underslung suspension springs provide the shock absorber units and are made of .020 music wire.

Mr. Gabriel organized the high school senior aero club in his town in the fall of 1934. It has been operating ever since. He says the boys have been doing splendid work and exhibited many models at the annual city hobby show held last year.

Mr. Gabriel is evidently quite upset about the remarks of certain model designers. He says:

"Where do companies and model designers get this day dream of putting about eight strands 1/8" flat rubber in a



Pict. No. 1. A perfect 15 inch scale model of a Boeing F4B-4 by Jack Dettis

Pict. No. 2. The scale Douglas 0-38 with which Harold Sherwood recently won a first award

Pict. No. 3. A biplane contest model that won the Canadian Wakefield Contest for F. J. Rogerson

Pict. No. 5. An excellent parasol wing contest model which won a second place for Edwin Oates

Pict. No. 6. E. F. Buehlman built this perfect wartime Nieuport scale model

Pict. No. 4. A scale Ford Tri-motor that flies well, by Lloyd Gabriel.

two foot model and tell you to put six to eight hundred turns on it? Four strands of brown rubber dipped in lubricant on a conventional two foot model will break and tear up a good fuselage near the five hundred mark. Our club challenges a reply to this."

What do other Air Ways members think; is Mr. Gabriel right or wrong?

Picture No. 5 shows the result of some excellent work accomplished by Mr. Edwin Oates of 50 Prospect Street, Thompsonville, Conn., another Air Ways Club member. Mr. Oates says he is a member of the Springfield Model Airplane Club of which Mr. Ernest Walen is the director.

The fuselage of the model is octagonal in cross section and well streamlined. It proved to be a great flier, having won second place in the Western Massachusetts Model Airplane Contest held last August and a first place in a club contest held later in the season. It is a model of original design.

In connection with the Y.M.C.A., a club is now being formed in Thompsonville, where Mr. Oates lives.

Recently most model builders have turned to modern ships rather than dwell on planes of World War vintage. However, E. F. Buehlman of 77 Remsen Lane, Floral Park, New York, has had a relapse; for he has built several very beautiful World War ships. One of them, a Nieuport scale model, is shown in picture No. 6. Those experts who are "in the know" will recognize by the propeller on the job that Mr. Buehlman has given careful attention to details. This is not an ordinary propeller but one cut to the exact shape of the large Nieuports.

Many builders have complained that they can build models successfully but have great difficulty in obtaining good pictures. Mr. Joe C. Fine of Kilgore, Texas, Box 441, clearly demonstrates that good pictures can be obtained of models in flight by presenting picture No. 7. The model is merely a simple stick tractor but the picture clearly demonstrates its flying qualities. The model is eighteen inches in span and flew for ninety seconds.

MODEL NEWS FROM OTHER COUNTRIES

Australia

Many Club members will remember the flying scale model of the Curtiss XF13C-1 Experimental Fighter which was published in MODEL AIRPLANE NEWS in July 1935. Mr. Fred H. Miller of 16 Oxford Street, Thompson Estate, Brisbane, Queensland, Australia, saw its possibilities as a contest flying scale model. He built it and vindicated his judgment. He won the Flying Scale Contest held at Victoria Park. The little ship and the trophy which he won is shown in picture No. 8. In the contest, points were awarded for trueness to scale, finish and detail, and duration.

He says the detachable wings was a very good feature, making it handy to pack and carry the model about. We wish to thank Mr. Miller very much indeed for his excellent contribution on the fine performance of this little ship.

Many fellows have been interested in compressed air models, but few have built successful ones. One of the fine ships of this type which has been built recently was constructed by J. D. Allcroft of Gosford, Australia. He appears in picture No. 9 with his ship, "Miss Windbag." The plane's average duration is fifty-five to sixty-five seconds. The ship is rather large, having a span of six feet, six inches.

We have word from Charles Martin, President of the Red Falcons Model Aero Club of 155 Herferd Road, Albert Park S.C. 6, Victoria. He says:

"We are a new club but we are making great progress. The record for our club at present is two minutes, twenty-one seconds made by Charles Martin, who won the Indoor Championship. Roy Taylor and Jack Bell tied for second place. Upon a second run between these two young men they again tied, so today these two hold second place jointly."

We wish this new club the best of luck.

South Africa

This month we hear from a country that has just become interested in model aeronautics. One of the pioneers of this art, Mr. A. G. Jones of 31 Barley Road, Parktown West, Johannesburg, Transvaal, South Africa, writes to us and tells us of the difficulties he and other model builders have had in South Africa in promoting model airplane building. He says:

"Balsa goods and wood were introduced for the first time in this city by a pal and me a year ago. The first competition was organized by the 'Rand Daily Mail', in which I happened to be the lucky winner, with an eighteen inch Curtiss Robin. However, I am quite certain that it was only because I

(Continued on page 42)

Pict. No. 10. A. G. Jones' Monocoupe in full flight. The best flight picture we've received

Pict. No. 7. Joe Fine's stick tractor "caught in the act." A real flight picture

Pict. No. 11. Bob Keegan of the Challenger Model Aero Club, starting his model

Pict. No. 8. A fine contest flying scale model and a trophy it won for Fred Miller

Pict. No. 9. A compressed air model that performs well, by J. D. Allcroft

Pict. No. 12. J. B. Flight Squadron No. 239 of Fort Pierce, Fla., Rt.

Pict. No. 13. The South River, N.J., Aero Club.

How to Choose Your Wing Section

Charts and Tables Which Will Enable You to Select an Efficient Wing Section for Your Model

By FRANKLIN SHEA

BY GOING through a process similar to that followed by aircraft designers, a scientific gas model builder can arrive at a more logical choice of airfoil for his design. While the difference in performance which would result from the use of any of the better sections is small, it is nevertheless noticeable; and the practice will be useful to future engineers.

The table lists the characteristics which influence performance most: maximum lift, maximum lift to drag ratio, and lift coefficient at the angle of maximum lift to drag. The coefficients are not used directly, but are taken as indications of performance. In the unstable group are sections whose centers of pressure move forward with increasing angle of attack, and backward with decreasing angles. The stable group includes sections whose c.p. travel is just the opposite. It is not possible to compare stable and unstable sections directly, as the stable curves automatically lose some maximum lift. Thickness at 15 and 60% of the chord is included to eliminate sections too thin for efficient spar depth. This becomes more important with larger spans and aspect ratios. The big idea in all of this is to pick the airfoil which best combines the qualities of high C/L max., high L/D max., good C/L at the angle of L/D max., together with sufficient spar depth. Other factors also color the choice. For example, parasol designs can use the unstable, higher lift sections to good advantage.

Other airfoils for comparison can be found in National Advisory Committee for Aeronautics reports Nos. 244, 286, 315 and 460. These may be secured from the Superintendent of Documents, Washington, D.C.

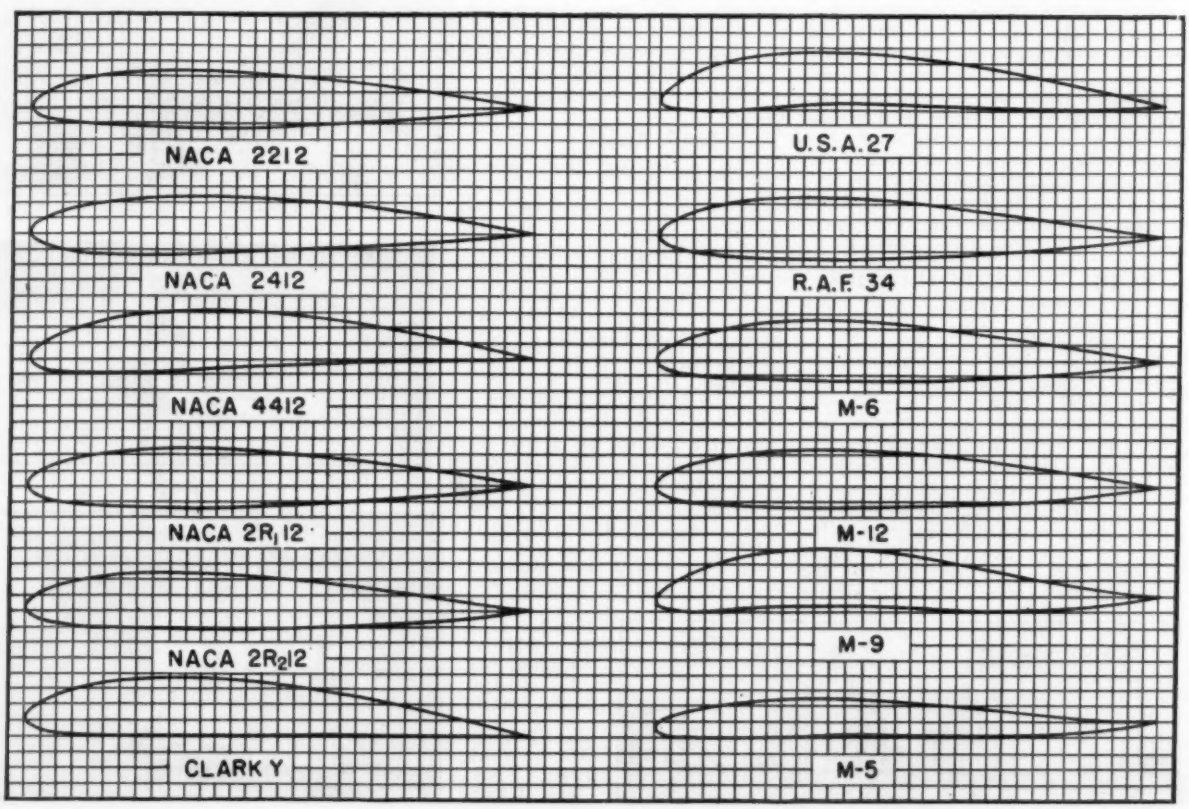
For plotting method see page 32, July, 1935, issue.

AIRFOIL	C_L MAX.	$\frac{L}{D}$ MAX.	C_L AT $\frac{L}{D}$ MAX.	THICKNESS 15%	THICKNESS 60%
UNSTABLE					
CLARK Y	1.23	21.0	.452	10.84	9.15
U S A 27	1.30	21.0	.49	10.60	9.82
M-12	1.30	21.9	.39	9.61	9.77
NACA 2412	1.62	22.5	.39	10.71	9.12
" 2212	1.60	22.4	.40	10.69	9.12
" 4412	1.65	22.1	.40	10.77	9.14
" $2R_112$	1.53	22.8	.38	10.70	9.12
STABLE					
NACA $2R_212$	1.47	19.5	.42	10.71	9.15
M-5	1.14	23.9	.45	7.18	6.82
M-6	1.23	23.2	.34	10.29	9.85
M-9	1.14	22.0	.43	11.11	9.92
RAF 34	1.02	20.9	.49	10.88	9.56

ORDINATES OF ABOVE AIRFOILS

CLARK Y			USA 27			M-12			NACA 2412			NACA 2212			NACA 4412		
%	UP'R	L'W'R	%	UP'R	L'W'R	%	UP'R	L'W'R	%	UP'R	L'W'R	%	UP'R	L'W'R	%	UP'R	L'W'R
0	3.50	3.50	0	1.77	1.77	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
1.25	5.45	1.93	1.25	3.80	.50	1.25	2.03	-1.65	1.25	2.15	-1.65	1.25	2.44	-1.48	1.25	2.44	-1.43
2.5	6.50	1.47	2.5	5.07	.36	2.5	2.86	-2.14	2.5	2.99	-2.27	2.5	3.35	-1.96	2.5	3.39	-1.95
5	7.90	.93	5	6.94	.19	5	4.01	-2.72	5	4.13	-3.01	5	4.62	-2.55	5	4.73	-2.49
7.5	8.85	.63	7.5	8.22	.10	7.5	4.89	-3.07	7.5	4.86	-3.46	7.5	5.55	-2.89	7.5	5.76	-2.74
10	9.60	.42	10	11.37	.36	10	5.59	-3.31	10	5.63	-3.75	10	6.27	-3.11	10	6.59	-2.98
15	10.69	.15	15	10.50	.10	15	6.61	-3.00	15	6.61	-4.10	15	7.25	-3.44	15	7.89	-2.88
20	11.36	.03	20	11.37	.36	20	7.30	-3.80	20	7.26	-4.25	20	7.74	-3.74	20	8.80	-2.74
30	11.70	0.00	30	11.97	.93	30	7.98	-3.98	30	7.88	-4.12	30	7.97	-4.03	30	9.76	-2.26
40	11.40	" "	40	11.88	1.14	40	7.86	-3.96	40	7.80	-3.80	40	7.68	-3.92	40	9.90	-1.80
50	10.52	" "	50	10.86	.75	50	7.25	-3.82	50	7.24	-3.34	50	7.02	-3.58	50	9.19	-1.40
60	9.15	" "	60	9.34	.29	60	6.27	-3.50	60	6.36	-2.76	60	6.07	-3.05	60	8.14	-1.00
70	7.35	" "	70	8.09	.06	70	4.98	-3.00	70	5.19	-2.14	70	4.80	-2.43	70	6.89	-.68
80	5.22	" "	80	6.10	.01	80	3.50	-2.31	80	3.75	-1.50	80	3.52	-1.74	80	4.89	-.39
90	2.80	" "	90	3.69	.12	90	1.89	-1.37	90	2.08	-.82	90	1.93	-.97	90	2.71	-.22
95	1.49	" "	95	2.26	.33	95	1.07	-.81	95	1.14	-.49	95	1.05	-.56	95	1.47	-.16
100	.12	" "	100	.67	.65	100	.20	-.20	100	.13	-.13	100	.13	-.13	100	.13	-.13

NACA $2R_112$			NACA $2R_212$			M-5			M-6			M-9			RAF 34		
%	UP'R	L'W'R	%	UP'R	L'W'R	%	UP'R	L'W'R	%	UP'R	L'W'R	%	UP'R	L'W'R	%	UP'R	L'W'R
0	0.00	0.00	0	0.00	0.00	0	1.89	1.89	0	0.00	0.00	0	1.81	1.81	0	0.00	0.00
1.25	2.24	1.57	1.25	2.30	-1.52	1.25	3.29	.59	1.25	1.97	-1.76	1.25	4.08	.44	1.25	1.45	1.82
2.5	3.10	2.17	2.5	3.16	-2.10	2.5	3.93	.34	2.5	2.81	-2.20	2.5	5.14	.15	2.5	2.10	2.14
5	4.29	2.86	5	4.38	-2.76	5	4.87	.09	5	4.03	-2.73	5	6.78	.00	5	3.13	2.81
7.5	5.16	3.28	7.5	5.29	-3.17	7.5	5.63	.02	7.5	4.94	-3.03	7.5	8.03	.05	7.5	3.90	3.25
10	5.84	3.57	10	5.98	-3.42	10	6.23	.00	10	5.71	-3.24	10	9.08	.15	10	4.48	3.53
15	6.82	3.86	15	6.97	-3.74	15	7.14	.04	15	6.82	-3.47	15	10.69	.42	15	5.36	3.91
20	7.47	4.02	20	7.58	-3.90	20	7.77	.07	20	7.55	-3.62	20	11.74	.63	20	6.00	4.16
30	7.98	4.02	30	8.00	-4.00	30	8.34	.13	30	8.22	-3.79	30	12.73	.80	30	6.70	4.32
40	7.76	3.84	40	7.83	-3.98	40	8.25	.07	40	8.05	-3.90	40	12.51	.66	40	6.72	4.32
50	7.63	3.55	50	6.73	-3.87	50	7.69	.02	50	7.26	-3.54	50	11.43	.40	50	6.25	4.11
60	5.94	3.18	60	5.49	-3.66	60	6.90	.02	60	6.03	-3.06	60	9.85	.09	60	5.40	3.69
70	4.61	2.72	70	4.06	-3.27	70	5.77	.17	70	4.56	-2.48	70	7.98	.01	70	4.32	3.09
80	3.16	2.10	80	2.61	-2.64	80	4.73	.59	80	3.06	-2.83	80	6.11	.32	80	3.03	2.30
90	1.63	1.26	90	1.26	-1.83	90	3.78	1.33	90	1.55	-1.77	90	4.52	1.28	90	1.63	1.24
95	.87	.74	95	.66	-.95	95	3.38	1.89	95	.89	-1.08	95	3.94	2.03	95	.89	.76
100	.13	.13	100	.13	-.13	100	3.13	2.50	100	.26	-.26	100	3.83	3.06	100	.00	.00



Ways and Means of Gas Model Success

(Continued from page 23)

flying well enough to make official flights. At the 1934 "Nationals" held at Akron, Ohio, there were 19 entries, eight of them making official flights. The others were put out of action due to balky engines and to crack-ups on testhops. Up to this time, it was considered quite a feat to have the models fly properly, let alone having them do any considerable time. However, some of the more successful builders were looking ahead and planning improvements on their designs. Their progress was very evident during the Eastern States meet held at Hadley Field, N.J. in the spring of 1935. The entries, as a whole, were more cleanly designed, and the workmanship was much improved. The best sign of improvement was the greatly reduced number of crack-ups, proving that the fellows were profiting from past experiences. The writer was fortunate enough to place first in the gas event with a time of 64 min., 40 sec., establishing a record which still stands at the time this article is written. (The general characteristics of the ship are mentioned a little further on.) At this meet, there were about 50 models entered, many of the contestants having brought two models with them. At the 1935 "Nationals" held at St. Louis, Mo., there were approximately 60 models entered in the "internal combustion event." Although gas models have established their position by this time, the activity is still in its infancy. It is growing all the while, and will continue to remain popular as long as there are people interested in airplanes and aviation.

Judging from some of the letters the writer has received, there are a great many fellows who would like to build a gas model, but don't know just how to go about it.

Following are some suggestions which should be of some help. First, determine just what sort of a ship you want to build, that is, is it going to be a small light-weight model, a speed job, or a large ship. A small light ship usually takes only a short time to build, it's easy to transport from place to place, and it can be made to perform well as far as flights go. A speed job is usually the center of attraction at a meet, and, once it's off, a great many "boy, look at her step!" may be heard, that is if the ship flies right. But if it's heading for a crash, you're bound to hear "Watch out! Here she comes!", after which the crestfallen owner sweeps up the remains—speculates on the probable cause of the crash, and plans to make his next ship better than ever. A large ship (of the record-holding type—with a 10 ft. wing span) offers many more opportunities for duplicating the construction of man-carrying planes, and for that reason, is the ideal type of model for those seriously considering aviation as a career. It is also well suited as a group project, for school clubs having a qualified "foreman" on the job to advise the fellows and to inspect each piece of work before it is assembled into the ship.

After you've decided what type of ship you want to build, the next step is the design of the model. Unless you've had a great deal of experience designing and building models, it is suggested that you build a

NOW SCIENTIFIC BRINGS YOU THE PERFECT GAS MODEL

Miss America GAS MODEL

7 ft. Wingspan ★ Weight 4½ lbs.

★ Here is truly the last word in gas models. This new kit for the "Miss America" Gas Model further emphasizes SCIENTIFIC leadership in design, construction, performance, and outstanding value.

★ The "Miss America" is the result of our determination to develop a really superior type of gas model. It has been put into kit form only after many months of experimenting and testing until it is no longer an experiment but a gas model with every feature worked out perfectly so that it gives exceptional performance.

★ In order to give to our customers the "Perfect" gas job, the finest qualities aerodynamically and structurally have been incorporated into this model. This is actually a miniature airplane, embodying the same features of design and construction as full scale ships.

★ Among other features of the "Miss America" model are balance tabs on rudder and stabilizer for correct adjustments of flights, and new type battery box which is very light and located in fuselage where batteries may be changed easily.

★ The model is beautifully colored, wings being doped a brilliant red and fuselage blue with black and white trim. It is built to accommodate either the Brown or Cyclone engines (or any reliable motor now on the market) simply by adding or taking out spacers of motor mounts in fuselage. Motors can be mounted into plane in 3 minutes.

★ On test flights the "Miss America" Gas Model has shown a consistent gliding angle of more than 16 to 1 and has kept aloft for over 22 minutes on 1 oz. of fuel.

22 minutes on 1 oz. ★ 18 to 1 Glide

★ Here's What You Get:—

1 PAIR PNEUMATIC RUBBER WHEELS

Two giant full-size detailed plans giving every bit of information needed for building and flying the plane; streamline tail wheel; large amounts of special wood cement, bamboo paper cement, red, blue and black dopes; complete printed-out wood containing ribs, bulkheads, wing tips, etc.; all strip wood of the finest quality accurately cut to size, special covering material; celluloid; rubber; hard wood propeller blank; complete set of hardware such as terminals, knife switch, nuts, bolts, machine and wood screws, heavy landing gear wire, landing gear brackets, brass grommets, dural angles for motor mount, sheet aluminum, battery wire, washers, etc.; 1/32" 3-ply birch for covering front of model; strip spruce for parts needing added strength; complete assortment of numerals, lettering, and "Miss America" insignia printed in red and blue on gummed paper; also many more parts too numerous to mention.

Complete Kit (Less Motor) **$7.50** Postpaid or at Your Dealer

SHOCK PROOF LANDING GEAR

This landing gear is built on same principle as those used in the real planes of today. Rear wire of landing gear enters fuselage, continuing across and out on opposite side of model. Landing gear wire is strapped to spruce beam in fuselage with rubber bands. When model lands the rubber band is stretched, taking up shock, and then returning to normal position. All parts included in kit.

LANDING GEAR BRACKETS

This is the very latest gas model feature and is exclusive with the "Miss America" gas model kit. Eliminates all soldering, welding, or binding of gear. All you do is insert wire landing gear in holes of bracket and tighten the set screws. It allows for adjustment of landing gear in any position or angle desired. Complete set of two brackets with set screws included in kit.

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ship that has already been proven—that is if you value your work and monetary investment. If you feel that you are qualified to design your own ship, here are a few suggestions that might be of some help to you. To design a ship that is efficient, dependable, and can be counted on to give the maximum service, try to incorporate as many of the following features as possible. (The record model, mentioned previously, contains practically all of them.)

"Low Wing Loading" (approximately ½ lb. per sq. ft. of area.) This will give the ship a low flying speed, which will tend to minimize the damage due to crashes, whether they be caused by faulty adjustment or by an obstacle in the way of the ship while it is in full flight or just coming in for a landing. The low flying speed also permits the model to remain in sight for a longer period of time than if it were a speed job. It also makes the job of following the ship a bit easier.

"High Power Loading" (approximately 32 lbs. per hp.) When choosing a power plant for your ship, be sure that it has enough surplus "kick" to allow the crate to climb fast when it has to. The engines on the market now are made so that you can throttle them down very nicely when you want to, so don't worry about over-powering your ship. Just be sure that it isn't under-powered!

"High Thrust Line." For purposes of stability, you want to have a high thrust line, and as near the center of resistance as possible. Should the model be adjusted to fly with this arrangement, the glide will tend to be rather steep when the engine cuts out. With the thrust line right close to the center of resistance, the ship may be adjusted for the best possible glide, yet it will fly without stalling all over the lot when the engine is running.

The "Center of Gravity" of the ship should be slightly under the thrust line. "The Center of Projected Lateral Area," meaning the center of the ship as seen from a direct side view, should be as near to the C.G. as possible. This will enable the ship to fly in rough weather, without its being unduly affected by side gusts, when other ships, with too high or too low a center of lateral area, would be blown into all sorts of hair-raising maneuvers.

"Dihedral Angle." The wing should have a dihedral angle of about 1 inch for every foot of span, that is, if the wing is 10 ft. in span, each wing tip should be 10 inches higher than the center section of the wing. Dihedral is very necessary for the stability of the model.

Now to get down to some desirable construction features!

"Detachable Motor Unit." This is an invention of Mr. Charles H. Grant and was used for the first time on the K.G.-1 gas model which he designed. You'll find a detachable motor unit very convenient. This arrangement will facilitate inspection and overhauling of the power plant. It also permits replacing an engine unit, should the motor act balky, with one which functions properly. A battery-box, with a spring contact arrangement, or a flashlight case modified to suit the purpose, should be included in the motor unit. When you have to renew the batteries, all you have to do then is remove the lock-pins that hold the engine unit in place, remove the engine unit, take the old batteries out of the battery-box, slip in a fresh set, slide the motor-unit into place, insert the lock-pins into their proper position, and you're set! This arrangement of having the motor unit held in place with lock-pins has proven to be a life-saver for the engine when the ship it was flying crashed into a hangar head-on. The only damage sustained was two wrecked fuselage bulkheads, at the stations through which lock-pins, which held the motor unit in place, passed through.

While we're on the subject of motor-mounts, remember to include an ignition switch that is readily accessible. There are many times when, after you have the engine turning over nicely, you want to shut it off for some reason—and shut it off in a hurry! It might happen that a spectator, unaware of the fact that the prop is turning over (the darn things are practically invisible when turning over full gun), might want to point out something of special interest to someone, and thoughtlessly point his finger right into the prop arc. Then's the time you'll want a switch badly! Not only would the prop just about wreck that person's finger, causing a lot of unpleasantness, but it would also wreck itself, (if it's a wooden prop). A wooden propeller is recommended for two reasons. In case you should be nicked by the prop, you won't be hurt as badly as though it were a metal prop. In the second place, should the ship crash with the motor running, (or even with dead stick), a wooden prop will break, thus stopping the engine before it can damage itself. If a metal prop were used, the engine would tend to run longer before stopping, possibly causing damage to certain parts. A bent engine crank-shaft is the usual result of a ship, with a metal prop, cracking up with the engine running.

It is desirable to have an engine cowl that will not complicate the removal of the engine unit to any extent. You might have the two sides and bottom of the cowl built permanently into the fuselage, with a movable or detachable top piece.

If the ship is going to be fairly large, it will cause you some trouble transporting it hither and yon, unless you take the trouble to do something about it. Something you might do about it would be to have a completely detachable fin, stabilizer, landing gear, wing mount (should your job be of the parasol type), and wing. It would also be a good idea to make the wing either in two or three sections. This would not only facilitate transporting the model from place to place, but would also permit substitution for any damaged parts of the ship in the minimum of time—an important feature during a contest, when time is so valuable. Don't forget to include a positive action shock-absorbing system on your landing gear. Don't rely merely on the wheels to take up the shock on "hot" landings. Another important thing about the landing gear is to have it well forward. This will help prevent nosing over on landings and reduce the number of broken props and fins. Last but not least on the subject of construction design. Remember that strength receives primary consideration, then lightness. Copy real plane construction as far as it can be applied to your model. Remember that the big ships are designed by expert engineers and their construction must be strong, yet light enough in order to do the job for which they have been designed.

One example of good model construction is having the complete ship covered with "skin-stressed" sheet balsa. This permits lighter internal structure, as the balsa covering really adds to the strength of the structure. If the model is paper or silk-covered, the frames are subjected to a great strain when the fabric tightens after being doped—and have to be built stronger (and heavier) to take the added stress.

(Continued next month)

$200.00 Cash to National Winners with "BABY CYCLONE" ENGINES

Cash prizes of $100 each are to be awarded the Junior and Senior winners of the Outdoor Gas Powered Contest at the Nationals, provided "Baby Cyclone" Engines are used.

Never forget that "Baby Cyclone" Engines are fully guaranteed and are backed by a sound, established and reliable organization.
Reference: Los Angeles Chamber of Commerce.

See "Baby Cyclone" ad on Opposite Page

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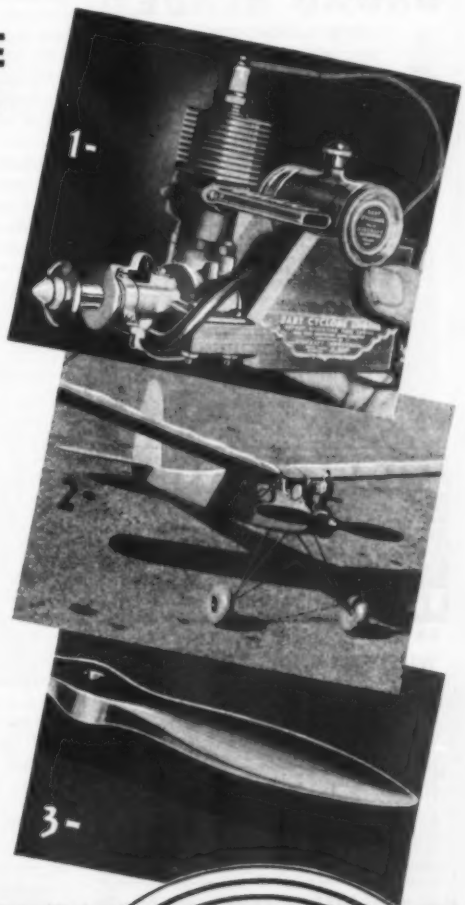

Major C. C. Moseley's big special offer announced last month must be extended. Orders have swamped us and it will be impossible to supply everybody before the original deadline expires.

We are therefore extending this offer, making it good until July 15, 1936. But that must be the end. Unless your order is post-marked before midnight July 15 you will have to pay the top price of $25.15 for this outstanding combination of "Baby Cyclone" Engine, "California Chief" kit, and Hardwood Propeller—ready to assemble into a flying model of spectacular performance.

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1. "Baby Cyclone" Engine complete including gas tank, coil, timer and condenser, mounted on wooden base after actual run-in test ready to install in the completed kit. Speed from 500 to 4000 R.P.M., develops 1/6 H.P. Runs 17 to 20 minutes on one oz. of gas. Weight complete 10½ oz. Backed by a responsible organization.

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Aircraft Industries, Major C. C. Moseley, Pres.
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3 sizes: 1½ in.; 2 in.; 3 in.

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Frontiers of Aviation

(Continued from page 11)

landing gear. The "Battle" recently underwent tests for the Royal Air Force with extraordinary success under the piloting of Flt. Lt. Staniland.

For the past many months there has been the reoccurrence of talk on a new type of construction to be used in a proposed English military plane for the R.A.F. It seems that Mr. Barnes Neville Wallis, chief engineer of Vickers (Aviation), Ltd., has invented a construction somewhat similar to lattice-work, a system of curved interlocking spars, Both wing and fuselage will be of this construction and will be almost completely monocoque. No heavy or complicated structure will be needed, making the fuselage and wing literally a hollow tube. The structure is very strong and will withstand the greatest stresses. A Vickers-Wellesley long-range bomber is now under construction for the Royal Air Force employing this new type of construction.

Another excellent English plane is the Heston Phoenix. It is true that this plane made its public appearance many months ago, but since then minor improvements were made in its design, and the sportplane is now in production. The first was scheduled to be flown from England to Australia by the famed young MacRobertson Race pilot, C. J. Melrose. Specifications of the Phoenix, a five-place high-wing monoplane, follows:

Engine—200 hp. D.H. Gipsy-Six
Bare weight—2000 lb.
Weight loaded—3,300 lb.
Top speed—148 m.p.h.
Cruising speed—125 m.p.h.
Landing speed—55 m.p.h.
Service ceiling—14,500 feet
Range—700 miles.

Pobjoy, builders of that famous little English 90 hp. engine, have developed a twin-row version of it. It produces more than 170 hp. with a weight of only 270 lb. The frontal area will be the same as the single-row Pobjoy Niagra, two of which have just been delivered to the Pitcairn Company for their roadable autogyro.

More interesting news from England is that the popular Percival Mew Gull racing plane will soon have a twin-engined successor. Miles, whose Falcon is now the most outstanding plane in England, will also produce a twin-engined sportplane shortly. Blackburn has just completed an excellent twin-engined low-wing monoplane for private and light commercial use.

With K.L.M. (Dutch), L.O.T. (Polish), and Swissair (Swiss) Airlines using American Douglases and Lockheed Electras on routes running parallel with Air France's airlines it has practically put Air France's passenger traffic at the zero mark. The public has chosen the new modern American airplanes in preference to the old transports still used by Air France. This has lead Air France to begin a large development program, and many new airplanes are under construction. Stephen J. Zand of the Sperry Gyroscope Company, Inc., was invited over to France to supervise the sound-proofing of the new planes and also the ones now in operation by Air France. Among the planes he sound-proofed were the Breguet-Wibault 18-passenger, Breguet-Fulgur 10-passenger, Farman 40-passenger, Block 2-motor, Bloch 3-motor, Dewoitine 24-passenger, and the Liore trans-Atlantic 4-motor plane. Of most interest were the new tri-engined 30-passenger planes which Mr. Zand had the opportunity to sound-proof during their construction. The nose engine is located far forward and aft is the pilot cab, then a general baggage compartment, the toilets and bar, and finally the passenger cabin. Thus the passengers are a long way from the nose engine, making the cabin easier to sound-proof.

Special merit must be given Caudron for the fine-looking twin-engined transport recently completed. The plane is of conventional design carrying ten passengers and powered by in-line engines.

Fokker has produced a low-wing pursuit, the D.21, powered by either a Bristol Mercury or Hispano-Suiza Yers engine. Speed: 250 m.p.h. with the former, 266 m.p.h. with the latter. It has a non-retractable full cantilever landing gear and has many of the features of the New Hawker fighter described in past issues of this paper.

A new dangerous rival for honors in the light plane race category at the National Air Races this year is Riley Burrows.

He has just completed the revamping of his minute racing plane and has successfully survived its first test hop which is something of an achievement. Riley only weighs 240 pounds, so much is required of his little ship in the way of lifting power. Surprising as it may seem the plane performs remarkably well and Mr. Burrows has the odds in his favor at this year's races. He never wears a parachute, nor could there be one put in the small cockpit with Riley in there at the same time. Furthermore the daring Mr. Burrows is completely locked in his ship when the windshield is placed over the cockpit which means that if anything should go wrong with the plane while travelling at a speed of about 220 m.p.h. Mr. Burrows must keep the plane company all the way to the ground. Even if this does not give Mr. Burrows many sleepless nights there must be some restlessness among the rest of the Burrows family.

Joe Jacobsen is building a new racing plane in Kansas City for the 1936 National Air Races. He, as you probably know, is the pilot of Benny Howard's racer, "Pete."

Mr. N. F. Scudder is also building a racing plane at Langley Field, Virginia, for the 266 cubic inch displacement races to be introduced for the first time at this year's races. It will have many unusual features.

The Delgado Maid which did such a fine job in hiding Cleveland's airport in a veil of smoke last year when its engine over-heated will be back on the scene this year with many improvements. Changes have been made in wing construction and streamlining, and a new engine has been installed.

Art Chester will have a plane of his own design ready for the 1937 Races. It

will be for the 397 cu. in. displacement class to be introduced that year.

The rebuilding of Howard Hughes racer will be completed very soon, and from present indications it appears that he may enter it in the coming Bendix Race. The fuel capacity of the ship has been increased and the landing flaps redesigned. The tail surfaces have been changed and a more powerful engine will pull the plane which now holds the world landplane speed record.

As this is read the latest super-Northrop pursuit should be about ready for its first trial flights.

Pasped, who recently produced the low-wing Sky Lark, is now working on another sportlane that may prove to be very popular. First because it will sell for about $1,200, second because the fuselage will be of all-metal monocoque construction, and third because it will be powered by a motorcycle four-cylinder converted engine. Pilot and passenger will sit in tandem fashion in an enclosure above the low wing. The single wing will be of wood spar and metal rib construction fabric covered. Landing gear is full cantilever. The small plane should give the Aeronca and Taylor Cub much competition.

Unfortunately for lack of room we cannot give you full details of the Aeroneer sportplane here, but will include a full description of this wonderful little plane in our next issue. Top speed is 147 on 125 hp. Entire plane is all-metal. It is undoubtedly the finest plane of its type in the world and greatly advances America's sportplane world standing. Watch for detailed first-hand information on this ship next month.

Pioneer is said to be very secretly developing a new horsepower recording instrument for aircraft engines!

Mr. Lawrence W. Brown has enlarged the capital of his company and will soon go into production on a proposed low-wing pursuit for foreign governments.

Beechcraft has a new 285 hp. Jacobs powered B17B plane on the market which cruises at 177 m.p.h.

HOW TO BUILD A SCALE MODEL OF THE BROWN B-3 SPORT PLANE

This new ship, designed and built by the famed racing plane designer, Lawrence W. Brown, was one of the most outstanding exhibits at the Los Angeles Aircraft Show held a few months ago. Detailed performance data on the ship is not available at this writing as the plane has not yet completed its flight tests. Bad luck prevailed during the ship's first test flight when the fuel line became clogged. The engine stopped when the plane was at 200 feet altitude while it was just crossing the boundary of the field—a serious predicament for any pilot. But Handley-Page slots are part of the plane's equipment and this permitted the pilot to turn back to the field without spinning, and thus the ship was saved from very serious damage—a very practical way, we must say, for proving the value of Handley-Page slots and flaps.

Construct the model with balsa wood which may be purchased in your nearest department store. Get dimensions from plans. If you wish to square-off the plans, making it easier for measuring, join the corresponding dots on the border with straight, even pencil lines.

Draw outline of top view of fuselage on stock and cut to shape with a jig-saw. Then draw side view and cut again. Round out the fuselage with a razor blade and chisel, referring to cross-sections on plans. Sandpaper thoroughly, first with coarse and then fine sandpaper.

Make the two wing halves and landing gear pants in the same manner. The tail surfaces (fin, rudder, stabilizer, and elevators) may be cut from sheet balsa with a razor blade and sanded down to smoothness. Be very accurate and take plenty of time. Hollow out the wheel pants for insertion of the wheels which may be purchased at nearly any model shop. Cut the four landing gear struts to shape and streamline with your razor blade.

The prop blades may be cut from sheet balsa and then joined to a balsa spinner with model cement with the correct pitch.

If desired the passenger cabin may be hollowed out and the enclosure built up with thin strips of a good grade of balsa

FAIRCHILD SEAPLANE
"Radio Control"

FAIRCHILD "29"

Not a Kit. The Fairchild Flying model is a ¾" scale copy of the recently approved machine of this type as equipped with Edo Pontoons. Our version of this model can also be flown as a landplane with removal of the floats and installation of the wheels, furnished. Seaplane also drops pilot with parachute through use of our "Radio Control," so called because of its operation while ship is in flight. The TROY "RADIO CONTROL" or AUTO-TIMER (pat. Pend.) is an adjustable timing device whose delay in operation may be ranged from 30 seconds to 1½ minutes and is wholly self contained. On the Fairchild machine it serves as a cabin door lock holding jumper in until machine reaches proper altitude and then releases him. Specifications: Length, 18¼ ins. Balsa bulkhead and veneer fuselage. Flexible Plastocele shock struts. Alum. wheels. Span, 27¼ ins. Wings and tail of balsa built up construction, tissue covered and water shedding finish. Silver wings and tail, fuselage, blue. Machine, with pontoons, wheels, and special propeller complete. $4.25.

Edo ¾" scale pontoons, model 44-2425 $1.50

Fairchild as described but as landplane. $3.25

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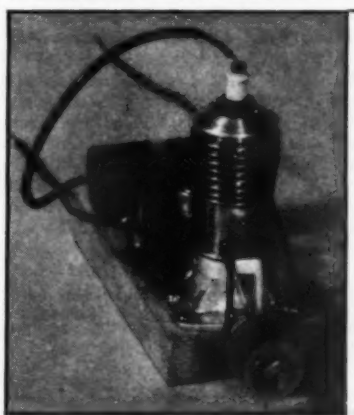

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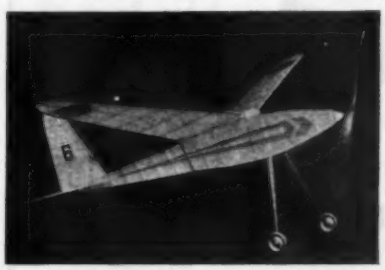
The Scorpion Major Gas model (below) is designed to present to the public a truly outstanding gas model. An airplane of advanced structural and aerodynamical design yet easy to build. The BUNCH Company has earned the designation—Home of Championship Airplanes—and as such is proud to introduce this remarkable new airplane. Specifications: Span 57"; full shock absorbing landing gear; airwheels; beam type motor and battery mount; adjustable rudder, C.G. and incidence.

Drawings full detailed and instructions cover complete building and flying information—how to make fast or slow flights—turns—and how to make the ship climb up in turns under power then glide in slow flat spirals landing close to take off point. The *Scorpion Major* is designed expressly for the *Gwin Aero* motor and with this engine full advantage can be taken of its marvelous speed range, however, other engine types of similar size may be used.



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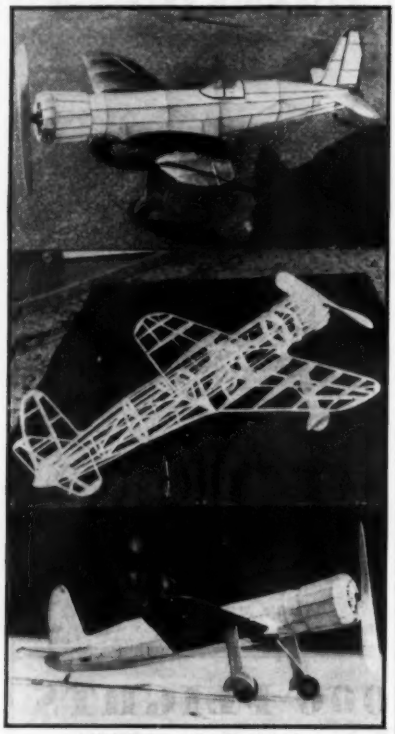

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wood that will bend easily. Connect strips together with cement and use cellophane as window glass.

In assembling the model be very accurate. Be sure all parts are sandpapered thoroughly. Lay the fuselage in flying position on a flat surface and propped up with blocks. Lay the wing halves in correct position alongside the fuselage with blocks under the tips to give the desired dihedral (see front view of model). Join connections with plenty of cement. While waiting for the wing joints to dry, connect the tail units. When these have dried lay the model on its back and put on the landing gear struts and then the pants with wheels enclosed. Straight pins may be used as axles for the wheels. Also join the small tail wheel which can be carved out of scrap wood. Join the prop to the nose, using a straight pin as prop shaft.

With putty or plastic wood fillet all joints to make perfect streamlining. Go over the entire model with fine sandpaper. Brush off all dust and put on the paint job.

The entire plane is to be doped red. Many coats will have to be applied. It is best to completely sandpaper the model once more after the first coat has dried. Several coats will have to be applied to obtain a smooth finish. Do not apply a second coat of dope until the first one has dried thoroughly.

When the paint job has been completed, connect up all wire bracing as shown on plans. It is best to use black thread for this. The thread may be joined to surfaces with small u-shaped pieces of wire and cement. When this has been accomplished, the model will be completed.

The Sportster Gas Model

(Continued from page 23)

than a dozen times without the slightest damage from flying it. The average "take off" distance is about six feet.

The following is a list of hints that will help construct the model.

(1) Wherever possible steam the spruce to shape in order to lessen the strain on the cement.

(2) Dowel and bind every joint in the fuselage and use two or three coats of cement.

(3) Take care to have the stabilizer parallel to the thrust line.

(4) Use plenty of cement on all the wing joints.

(5) Use whatever method you have found best to fasten the wing halves together but be sure that each wing tip is 6½" from the table top.

(6) The landing gear is wire faired with spruce. It is a split-axle type with rubber or spring for shock cord.

(7) The motor mount is duralumin (½" 90° angle).

(8) Don't offset your motor in any way.

(9) Before covering your model, balance it by placing the coil and batteries in the proper position.

(10) Bamboo paper was used on the original model but silk is recommended because it doesn't crack as easily.

Excess detail was omitted in the drawing to give the model builder a chance to use his own ingenuity and originality. General dimensions should be adhered to but the motor mount, landing gear, etc., may be constructed to suit the builder.

Model Builders Hall of Fame—Vernon Boehle

(Continued from page 7)

built about a hundred models and has entered in twenty contests. Out of these twenty meets he has won twenty-five prizes, among them a gas motor, several pairs of field glasses and cash.

His Moffett entry, which won the trophy at St. Louis, was constructed about three weeks before the contest. It had a long taper wing, nearly five feet, and a thirty-five inch fuselage length. It swung a nineteen inch prop on sixteen strands of rubber. Intelligently conceived, it was made for a larger prop than on any of his other commercials because he knew that the finals were run late in the afternoon when there were no convection currents remaining. On test flights it would average two and one half minutes in dead calm. His Moffett-winning entry cost seventy-five cents in supplies and required thirty hours of workmanship, and as it would not be difficult to construct another one, Vernon admits he would sell it for twenty-five dollars.

Young Boehle expresses a desire to win the Wakefield trophy provided it ever comes back to the United States for competition. At the time of writing, we are reliably informed that Gordon Light has done just that little thing which throws Boehle's hat in the ring and you can take it from your correspondent that it is practically his already. After setting his eye on the Moffett and then getting it, far be it from us to deny him the pleasure of at least thinking he will get the Wakefield. Of course Gordon might have something to say about that but between the two of them we are quite sure that the Wakefield trophy does not exactly have a dull existence in store for

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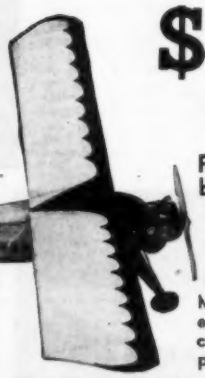

- Wing Span—60 in.
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itself. By that time the "Old Mug" should feel properly acclimated and what with a new facial, it ought to stir up plenty of what it takes to keep people awake.

The element of luck does not accurately account for Vernon's success. If it had, there is too much consistency of performance to be explained. It is evident that Vernon applies a common-sense theory to his models and such a little detail as increasing the swing on the prop of the Moffett model because the finals did not come until late in the afternoon, though perhaps microscopic in the routine of build-and-fly, is nevertheless an example of intelligent application of fact and theory which eventually is essential for any degree of success in the sport.

No story about Vernon could be complete without reference to his father, Arthur Boehle, who is a most enthusiastic devotee of the art. Present at all contests with his son, his passion for model aircraft is perhaps equalled only by his interest in his son.

A Test Model for Beginner or Expert

(Continued from page 9)

to the wing incidence. These adjustments will remain in position until forcibly removed, if the twine is properly used as mentioned.

Miscellaneous

The landing gear and all other wire parts are made of (.028") music wire, preferably cut from straight lengths. Before the spreader bar is put in place, slip the wheels on the axle and bend the ends of the wire rearward as shown in Fig. 1. This will hold the wheels on. Now the spreader bar is put in place and the correct amount of clearance can be allowed on each side of the wheel. Attach the landing gear on the motor stick with thread and cement.

The "can" is made of .012" sheet aluminum. The circular part is formed by bending around a tube, punch or the like. Secure it on the motor stick with thread.

The average model made from these plans will require about six strands (3 loops) of 1/16 x 1/30 rubber. Your particular model may fly better on more or less rubber, depending on the weight. If it is built to be of light weight, the machine will operate and maneuver successfully in a moderate sized gymnasium.

If you are inclined to work out experiments, it is suggested that you use a raised line of thrust and set the wing accordingly. This special set-up will improve the combined climbing and gliding qualities to an extreme degree. In fact, during the summer just past, a friend of the writer entered one of these ships with the raised thrust line setting, in an outdoor contest among the younger boys. The plane took first place and was flown in competition with stick models of far more advanced design, using curved wing sections, tapered wings, etc.

The best results seem to be obtained when the wing is placed where the center of gravity will be located between 33 1/3 and 50% of the chord, rearward from the entering edge of the wing. The stabilizer is then adjusted to obtain a perfect glide.

Bill of Material

1 8" machine-cut propeller
1 thrust bearing
2 propeller shafts (one for rear hook)
1 pair of 1" wheels
2 ft. of .028" music wire
1 motor stick, 3/8 x 1/4 x 12" balsa, very firm and straight grained.
1 bamboo 1/32 x 3/32 x 4 3/4"
1 1/16 x 3/16 x 18" balsa wing spar
1 1/8 x 1/8 x 18" balsa wing spar
2 strips 1/16 x 1/16 x 36" balsa
1 1/16 x 1/8 x 36" balsa
1/3 sheet of tissue.
Misc.: 6 small washers, 1 bead for thrust, cement, tissue cement, rubber for motor, cotton twine, thread and some spare time!

The author will be glad to answer any questions concerning this model if addressed to him care of the editor, accompanied by a self addressed, stamped envelope. Some builders may desire to know more about how to make a thrust line adjustment.

Build This Flying Fairy Fantome

(Continued from page 15)

remainder of the landing gear in place. Cross-hatch the radiator front with pencil.

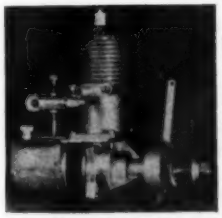
Doping

Spray the tissue with water and it will tighten when dry. One coat of dope carefully applied should be enough. Cowl, landing gear, propeller, lettering and inspection doors are aluminum or gray. Wings and stabilizer, orange. Fuselage, fin and rudder, medium blue. Tail skid, wheels and exhaust stacks, black. The rigging threads are No. 8 white, and are usually sewn on with a large needle. It is advisable to leave rigging off a flying model. Now the windshield, machine-gun sights and muzzles, and any other detail may be added.

Motor Assembly

Scald the sheet balsa for the motor tube and bind it around a 11/16" dowel rod with cloth tape. Make the end plugs to fit snugly into the tube after the tube seam has been cemented thoroughly. Cover the tube with tissue, the grain around the tube.

FOR EASY STARTING



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Vought Corsair..... 1.25
Plus Postage 15c

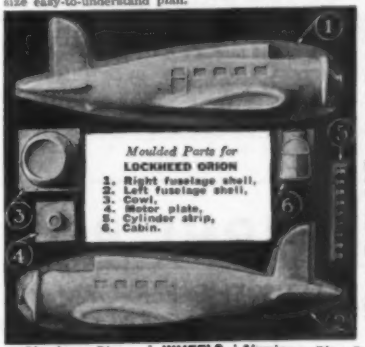
Each of the SELLEY-TEX Construction Sets contains the necessary individually designed moulded scale parts similar to those shown below.

Wing Span 20"
Length .....12¾"

LOCKHEED ORION

$1.25
15c Postage

Every SELLEY-TEX kit is complete with semi-finished flying or scale propeller, formed wire hooks, scaled wheels, with brass bushings, ribs printed out accurately on white sheet balsa, many special turned wood parts, finest grade of balsa wood sticks, tail wheel and fork fittings, and wire, pure para rubber, colored paper, authentic markings, colored insignia, best quality cement, colored dopes and full-size easy-to-understand plan.



SELLEY-TEX MOULDED PARTS

Aluminum Disc Rubber Tired Wheels
1½" dia..... 5c ea.
2" dia..... 6c ea.
2½" dia..... 7c ea.
2½" dia..... 8c ea.
3" dia..... 9c ea.
3½" dia..... 10c ea.
4" dia..... 11c ea.

Balloon Tire Aluminum Disc Wheels
1½" dia.....25c pr.
1¾" dia.....28c pr.
2" dia.....30c pr.

Treaded Rubber Tire Aluminum Disc
1 3/16" dia..30c pr.
1½" dia.....40c pr.
2" dia.....50c pr.
3" dia.....60c pr.
3¾" dia....$1.50 pr.
6½" dia....$2.00 pr.
7" dia....$2.50 pr.

Axle Fork and Swivel Joint
1¼ up to 5½" wheel 10c
1¾ up to 7½" wheel 15c
Postage 3c pair; on Rubber Tired Wheels, 4c pair

WHEELS

SEND 5c for GAS MOTOR PARTS

Aluminum Disc Rubber Tired Air Wheels
1" dia.....15c pr.
1¼" dia.....18c pr.
1½" dia.....20c pr.

Celluloid Balsa Wheels Wheels
⅝" dia. 06cpr. 04 pr.
1" dia. 08cpr. 05 pr.
1¾" dia. 10cpr. 07 pr.
1⅞" dia. 15cpr. 10 pr.
3" dia. 35cpr. 35 pr.

Balloon Tired Celluloid Disc Wheels
1¼" dia.....30c pr.
1½" dia.....33c pr.
2" dia.....35c pr.

AXLES Threaded and fitted with washers, bushings and nuts
Lengths 1/16 3/32 1/8
2"-5"-6" .12 .10 .20
7"-8"-9" .14 .12 .23
10-11-12 .18 .15 .25

Spun Aluminum COWLS

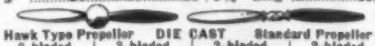
Dia.	Ring	Face	Face
1"	15	15	15
1½"	15	15	15
2"	20	20	20
3"	28	28	28

LEWIS GUN
1¼" Long.....10c
1¾" Long.....10c

RING MOUNT GUNS
1¼" Long B.....25c
1¾" Long A.....30c

PURSUIT GUNS
¾" Long 3c 1" Long 4c
1½" Long.....5c

SWIVEL TYPE GUNS
2" Double Action.....15c
⅞" Ratchet Gun.....5c



Hawk Type Propeller 2-bladed		3-bladed		DIE CAST 2-bladed		Standard Propeller 3-bladed	
3¼"	25c	4"	35c	1½"	6c	1½"	10c
4"	30c	4½"	45c	2"	10c	2½"	12c
4½"	35c	5"	50c	2½"	10c	3"	25c
5"	35c	5½"	60c	3¼"	15c	4"	35c
5½"	40c	6"	70c	4"	20c	4½"	45c
6¼"	45c	6½"	80c	4½"	25c	5"	60c
7"	55c	8"	90c	5"	30c	7"	70c
8"	65c	9"	$1.00	5½"	35c	8"	80c
9"	75c	10"	1.10	6¾"	40c	9"	90c
10"	85c	11"	1.25	6½"	45c	10"	$1.00
				8½"	50c		

Props can be had up to 24 in. dia. Postage 6c each.

Try your leading Dept. store or local dealer first. If you can't get SELLEY-TEX, please mention your dealer's name and address. Send 5c for complete Catalog.

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LOOK!!!

Just look at this list of experts who use only the **GENUINE MRL SPECIAL BROWN RUBBER** to establish world records: Frank Zaic, Vernon Boehle, Herbert Greenberg, John Stokes, Carl Goldberg, John Haw, Torrey Capo, Richard Korda, Bob Cahill, Mayhew Webster, and many others but it would take a book to name them all!

WHY???

SIMPLE! They know that in order to get longer flights they must use the BEST—MRL!

ALTITUDE!!!

Do your ships have to struggle for altitude? Are you discouraged when your ship comes down with half the turns still in the motor? If so, try using **GENUINE MRL SPECIAL BROWN RUBBER**, and watch your model go twice as high, twice as far, and stay up twice as long! Here's a size of rubber for every craie! FREE lubricant with every shipment if you ORDER NOW at these new low postpaid prices!

1/32—35 ft. 5c—225 ft. 20c
3/64—25 ft. 5c—225 ft. 25c
1/16—20 ft. 5c—225 ft. 30c
5/64—20 ft. 5c—225 ft. 35c
3/32—15 ft. 5c—225 ft. 45c
7/64—15 ft. 5c—225 ft. 55c
1/8 —10 ft. 5c—225 ft. 60c
9/64—10 ft. 5c—225 ft. 70c
5/32—15 ft. 10c—225 ft. 75c
11/64—15 ft. 10c—225 ft. 85c
3/16—15 ft. 10c—225 ft. 90c
1/4—10 ft. 10c—225 ft. $1.10

MRL SPECIAL BROWN RUBBER LUBRICANT

Lubricant not only protects the rubber, but gives longer flights! MRL LUBRICANT is guaranteed to greatly increase your winds, or we will refund your money! Experts have been using MRL Lube for years! Find out what you have been missing by ordering now!
Medium tube—10c; 3 oz. can—30c; 8 oz. can—65c.

MRL MICROFILM SOLUTION

Do you want light, strong, flexible, non-sticky sheets of red and green film? You can get them every time with MRL film! The directions that come with every can are so simple that even beginners use MRL Microfilm successfully!
3 oz. can—30c; 8 oz. can—65c.

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Why add a lot of weight to your model with ordinary cement? MRL CONTEST CEMENT is light, strong, fast-drying, colorless, and last but not least, a little of it goes a long way! The perfect cement for indoor models, and for cutting down the weight of your outdoor jobs! Once you try it, you'll always buy it!
Small tube—5c; Medium tube—10c; Large 3 oz. tube—30c.

MRL'S NEW SPECIAL ASSORTMENT D

Take advantage of this bargain! Now you can get these special MRL Products more cheaply than ever! 225 feet of 1/8", 45 feet of 3/32", a full 3 ounce can of Lubricant, and a 15c tube of Contest Cement ALL FOR ONLY—$1.00.

CONTEST BUILDERS! ORDER NOW! DON'T WAIT! ORDER NOW!

ALL PRICES POSTPAID! No Orders Under 50c Accepted! DEALERS! Write for NEW LOW Price List!

MODEL RESEARCH LABORATORY
3529G-N. Western Avenue Chicago, Illinois

Fasten the propeller to the shaft in the usual manner and equip the tube with 8 strands of 1/8" lubricated rubber. To wind, remove the rear plug and insert winder hook in eyelet. Stretch the rubber and wind in.

Flying

The last check-up should show zero incidence in both wings and stabilizer. Insert the motor tube and turn the disc left to lock the tube in. Test the model by flying in tall grain or grass, gradually increasing the number of turns on the motor until the desired performance is obtained. Now give her full gun—and good luck.

List of Materials—Fairey Fantome

1 1/2" x 1 1/8" x 7" and one 1" x 1 1/8" x 8" hard prop blocks
2 1 3/6" x 2 3/4" x 7 3/8" soft cowl blocks
1 7/16" x 2 7/8" x 4" soft "bottom block"
2 1/4" x 1 1/4" x 1 1/2" med. blocks for L.G. stubs
1 3/4" x 1" x 10" hard block for plugs, pants, and wheels
2 1/8" sq. x 18" strips
6 3/32" sq. x 18" strips
2 1/8" x 1/4" x 12" strips
2 3/32" x 3/16" x 12" strips
4 1/16" sq. x 18" strips
1 3/32" x 1/8" x 12" strips
2 1/16" x 2" x 12" sheets
4 1/32" x 2" x 12" sheets
1 1/8" x 2" x 6" sheets
6 1/16" x 1/4" x 15" bamboo strips to split tips and fairings
1 oz. banana liq.
1 oz. cement
2 sheets tissue
1 oz. Aluminum glossy dope
1 oz. med. blue glossy dope
1 oz. orange glossy dope
1 oz. thinner
1 dram black lacquer

Miscellaneous

1 ft. No. 8 music wire, 1 ft. No. 16 music wire, 3 ft. No. 8 wire thread, piece 1/2" x 1 1/2" model celluloid, - 1 3/16" dia. 1/32" thick alum. disc for nose plate, piece aluminum or bond paper 3" sq. for hinges or inspection panels, 1 oz. flour, a soda straw, and plenty of graded sandpaper.

The Development of The Light Plane

(Continued from page 5)

between the lower wing spars into streamline housings built against the sides of the fuselage. The combination of a relatively wide fuselage and a narrow landing gear tread made this arrangement possible. Wing-tip ailerons, mounted on the upper wings, provided very effective lateral control as well as increasing the efficiency of the wing. This type of aileron, in modified form, was used on the Curtiss Tanager, winner of the $100,000 Guggenheim Safety Contest in 1930. For added efficiency and ease of control, several types of sailplanes employed wing-tip ailerons, the well-known Bowlus "Albatross" being a typical example.

Interplane struts of the Martin ship were shaped like the letter "K," the front spars being linked by a vertical strut, with adjustable tie-rods joining the center of the strut to the rear spars of the wings.

Powered with an A.B.C. Gnat 40 horsepower engine and weighing only 350 pounds, the baby scout attained a top speed of over 135 miles an hour. This remarkably high speed in proportion to the power was due largely to the retractable landing gear. It has been proven by actual test that an unretracted landing gear may constitute as much as 32 per cent of the total resistance of an airplane.

Shortly after the World War, motorcycle engines became very popular with American lightplane engineers, mainly because no other inexpensive engines were available at that time. A great many commendable designs were based on this type of power plant. Yet, it should be borne in mind that a motorcycle engine in its ordinary form is entirely unsuited for airplane use. An airplane engine is of the heavy-duty type; that is, it has to run at nearly full power most of the time. A motorcycle engine is designed for flexibility, and can only deliver its maximum power in short spurts. If run at full throttle for a long time, it usually breaks down. Of course, that doesn't mean that the engine is poorly built; it just isn't designed for that kind of work. Nevertheless, with a few minor alterations to make them better suited for the purpose, motorcycle engines have been successfully used in light airplanes.

A typical example was a small biplane powered with a 15 horsepower Excelsior motorcycle engine, built by Carroll & Stupar during the latter part of 1918. With a span of 26 feet, it weighed only 225 pounds, and showed fine performance in spite of its low power.

1 hour and 3 minutes!

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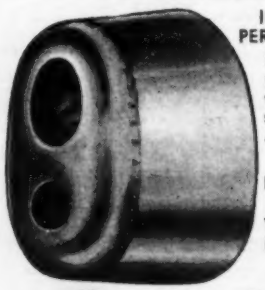

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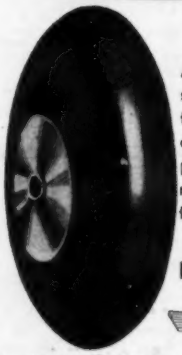
Nose Dimensions
Width 3 1/4"
Height 5 1/2"
Length Overall 6"
Weight 1 1/2 oz.
Price, $2.50



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Dept. D

The Gallaudet "Chummy Flyabout", built in 1919, was perhaps the most unique motorcycle-motored airplane ever built. Powered with two 18 horsepower Indian motors driving pusher propellers, it was a two-seater biplane with a span of 33 feet and an empty weight of 600 lbs. The high speed was 80 miles an hour, which is equal to that of most planes of comparable power even today. And it should be borne in mind that the air resistance of the motors, mounted as they were on each side of the fuselage like a bomber, was much greater than that of a single motor mounted on the nose.

The B.A.T. "Crow," a British lightplane appearing in 1919, incorporated quite a few novel features. It was a monoplane with a span of 19 feet and a length of 14 feet. Instead of a fuselage, the pilot's compartment was a streamline structure about the size of a motorcycle sidecar, the tapered cantilever wing being mounted directly above in "parasol" fashion. The engine, a 40 horsepower A.B.C. Gnat, was mounted on the leading edge, while the tail was supported by cantilever outriggers. In general design, it bore a remarkable resemblance to the modern Sikorsky Amphibian. With a wrench and a pair of pliers, this tiny machine could be dismantled or assembled in a few minutes. Its high speed was 75 miles an hour, and the empty weight was 225 pounds.

Appearing the same year as the "Crow," the Pensuiti-Caproni was a tiny Italian triplane with a span of only 13 feet 1 inch, and a length of 12 feet 6 inches. The lower wing was a few inches below the fuselage, like the World War Bristol Fighters, and the landing gear tread was nearly as great as the wing span. An Anzani three-cylinder radial engine of 35 horsepower was installed. Its landing speed of only 25 miles an hour was remarkably low for such a small job.

Still another unusual lightplane brought out in 1919 was the Hild-Marshonet biplane, powered with a 20 horsepower engine built by the makers of the plane. It had no fuselage in the strict sense of the word, the pilot being seated in a streamlined nacelle, with an outrigger of boxed cantilever construction, attached directly behind the seat, supporting the empennage. The cockpit was very easy to enter, due to the novel construction. For storage purposes, the ship could be taken apart in a few moments.

The little U. S. Army "Messenger," produced by the Air Service Engineering Division under the direction of Lawrence Sperry, was a very neat job. It was a biplane with a span of 20 feet and an overall length of 17 feet 9 inches. The center section was exactly the same width as the fuselage, and all four wing panels were the same size. Wing-tips were square. Ailerons were located on both upper and lower wings. There was not a single external bracing wire on the ship, diagonal struts being used instead. Streamlined struts replaced the usual flying wires, making landing wires unnecessary. The entire job was very simple and clean-cut in appearance. Powered with a 60 horsepower Lawrence 3-cylinder air-cooled engine, the top speed was over 100 m.p.h.

Many novel stunts were performed with the tiny "Messenger." On one occasion, it was landed on the White House lawn and taxied up a board runway laid on the steps of the executive mansion. It was fitted once with gyroscopic controls operated by wireless. With nobody in the ship, it made quite a few successful flights under perfect control. In another experiment, short skids were mounted under the fuselage just forward of the landing gear, while the latter was rigged so it could be dropped in flight by pulling a lever at the right-hand side of the cockpit. The idea was to drop the landing gear in case an emergency made it necessary to land in a very small place. In trials, the skids would bring the ship to a stop in less than 50 feet. The resistance and weight of the skids were considerably less than an ordinary landing gear, so they added a few miles to the speed when the wheel gear was dropped.

Appearing in 1920, the Macchi "16" was a tiny Italian biplane with a span of 19 feet 8 inches and a length of 13 feet 9 inches. The deep-chested fuselage, extending below the lower wings, carried the landing gear axle sprung directly across the lower longerons with shock cord. In that respect, it resembled the early Aeronca fuselage. Powered with an Anzani 30 horsepower engine, the high speed was 83 miles an hour with a landing speed of only 25 miles an hour—quite a remarkable speed range.

The Ricci "R-6" triplane was another Italian machine appearing that year. With a span of only 11½ feet, it was perhaps one of the smallest successful airplanes ever built. An Anzani 40 horsepower engine was installed.

A little French lightplane built just after the World War was, no doubt, the smallest twin-motored airplane ever built. It was the Didier "Oiseau Bleu" (Bluebird). Powered with a couple of 3 horsepower engines driving pusher propellers, it had a wingspread of 16½ feet and a length of 8½ feet. There are no records of any flights being made with the Bluebird. In view of its limited power and small wings, it is doubtful whether it ever flew. However, if it was light enough in weight, short hops might have been possible.

Designed by Dwight Huntington in 1920, the Huntington "H-12" monoplane was a very popular little job in the United States.

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ILLUSTRATING MODEL PLANE IN POSITION
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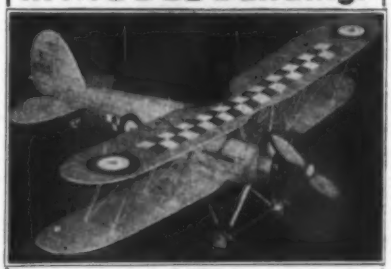
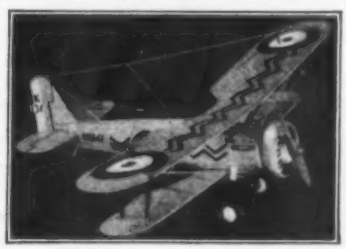


GLOSTER GAUNTLET—Kit No. X-16. Wingspan 21" **$1.00**

You have the greatest thrill of your model building career ahead of you—when you build this great model! It's a Comet "scoop"—an accurate scale model of the pride of the British Royal Air Force. Has the famous Auto-Line-Up construction, built-up motor, laminated cowling, movable controls, complete cock-pit interior, full insignia.



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21 MIN. on ½ OZ. OF GAS USING CYCLONE MOTOR

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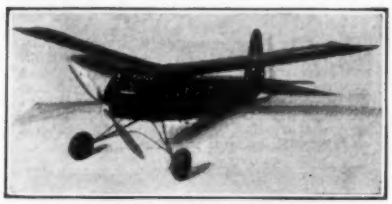

THE SCOUT

Built around the new 1936 Cyclone.

With a wing span of 54" this ship has the same unusually fine flying qualities as the Corben. With a wing span of 48" the Scout has a speed of over 50 M.P.H. and an exceptionally fast climb. Weight 2 Lbs. ready to fly. Same high strength to weight ratio as the Corben. Plans show both the 48" and 54" wings. Kit complete with Silk and Air Wheels $7.25, same kit but with Bamboo paper and rubber "DoNut" wheels, $4.85. Postage on either 50c.

Corben Plans $2.50. Scout plans $1.50. Pine props, Gloss Finish, High Performance, Brown or Cyclone $1.25. Hard Wood props $1.50. 3½" Air Wheels $1.75. Silk 50c yd.

WE NOW HAVE BABY CYCLONE MOTORS IN STOCK FOR IMMEDIATE DELIVERY.

DEALERS: Liberal discount on one motor or one kit. Use letterhead. Tie up with the line that sells if you are interested in profits.

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Half scale **Thompson Sub Machine Gun** model kit	$1.00
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Luger 9 M/M auto. pistol w/ four in. mach. barrel	1.75
Same as above with six inch machined barrel	1.90
Colt single action army revolver FRONTIER model with machined cylinder, rod ejector and four and three quarter inch barrel	1.45
Above with five and one half inch barrel	1.55
Above with seven and one half inch barrel	1.70

FREE

25 cal. Colt Automatic regular 50c kit free with every order of $2.00 or more.

These beautiful kits are complete in every detail and made of the best basswood. All parts are cut to shape and require only a short time to finish.

They are to be made for display purposes and you will be more than proud to show them to everyone. Postpaid in U. S. A. NO STAMPS PLEASE. Checks 15c extra.

GUN MODEL CO., Dept. E7, 2908 N. Nordica Ave., Chicago, Ill.

Powered with a motorcycle engine, it was one of the simplest airplanes ever designed. In fact, the designer claimed that it could be built, without the motor, for less than eighty dollars. The 20 foot wing was mounted at the upper longerons, but visibility was improved by the addition of windows in the sides of the fuselage at the cockpit.

Incidentally, the Huntington job was one of the first airplanes to be offered to amateur builders in construction-kit form. Much credit is due this little ship, because it ushered in an era of lightplane popularity and created a demand for designs that were suitable for home construction.

And now, let's turn our attention to some of the typical lightplanes of today.

Ford automobile engines, both "T" and "A" Models, as well as a few other light car engines have been used in lightplanes within recent years. The Storms "Flying Flivver," powered with a "T" Model engine, is one of the best-known ships of this type. In construction, it is a typical parasol monoplane with a span of 31 feet. It is very easy to fly and has a landing speed of less than 20 miles an hour. The designer, Mr. N. E. Storms of Asheville, N. C., claims that anyone who can ride a bicycle can teach himself to fly the ship in perfect safety. In one test, he released the controls at an altitude of about 500 feet above the airport, cut the switch, and let the ship land itself with no damage except a bent landing gear strut.

Two other very popular Ford-powered jobs are the Pietenpol "Air Camper" and "Sky Scout." Both ships are almost identical in design, except that the "Air Camper" is slightly larger and is a two-seater powered with a Model "A" engine. The "Sky Scout" is a single-seater, powered with a Model "T". Both types are built for safety rather than high performance, their construction being very rugged and able to withstand rough handling and hard knocks.

The Corben series of lightplanes, including the Baby Ace, Junior Ace and Super Ace, are very popular ships today. The Baby Ace and Super Ace are similar in size and appearance, except that the latter is powered with a Model "A" Ford engine as standard equipment and is more streamlined and racy in appearance than the former. The Junior Ace is a two-seater, powered with a Salmson 9 cylinder 40 horsepower engine. Ordinarily, it is an open-cockpit parasol monoplane, but it can be converted into a cabin plane in a few minutes by simply adding a light superstructure to the fuselage.

Another Ford-powered job which has a very fine performance is the Epps biplane, built by Ben T. Epps, of Athens, Georgia. Mr. Epps, incidentally, was Georgia's first airplane pilot, having taught himself to fly in 1907 in a ship of his own design. The Epps biplane has a span of 28 feet and an empty weight of 700 pounds. The useful load is 400 pounds, while the top speed is 70 miles an hour.

The Harlequin-Longster, a small single-seater monoplane, is of particular interest because its designer, Mr. Leslie Long of Cornelius, Oregon, also built the motor of the ship. Using most of the parts from a Harley-Davidson motorcycle engine, and a crank-case and shaft of his own manufacture, Mr. Long made a very efficient engine, delivering 35 horsepower with a weight of only 90 pounds.

There are other fine jobs that can't be described for lack of space, but those included herewith are typical of the ships being turned out for amateur flyers.

Pioneers in aviation pinned their hopes on low-powered airplanes. And if the work of amateurs is encouraged, lightplanes will continue to play an important part in the advancement of aeronautical science.

Proportioning Your Model for Stability

(Continued from page 13)

wing is established by the weight of the landing gear struts and wheels. These are to be fairly heavy in order to weight the nose of the model and thus insure a position of the wing that is well forward; about five inches from the nose. Under these conditions, the center of gravity is usually quite low. A good estimate is *one inch* below the center line of the rubber motor (Line of thrust). This distance is represented by (T) in the formula, so we know that T = 1 inch. A very accurate method of determining the value of T is by the means of the formula, $T = 2/5\left(\frac{M}{N}\right)$. Substituting the values of the symbols in the formula we have:

$$T = \tfrac{2}{5}\left(\frac{13}{5}\right), \text{ or } T = \frac{26}{25} = 1.04 \text{ inches.}$$

Knowing the values of (T), the value of (G) can be determined. In this model the center section of the wing with a normal dihedral would be on a line with the line of thrust, so the distance (G) will be the same as the distance (T). Therefore, G=1 inch. Inserting the symbol values in the formula we have:

$$A_s = \left(\frac{9}{8}\right)\left(\frac{70}{3(13)}\right)\left(2(3)+5\right)\left[1-\left(\frac{2.5+\frac{2(0)}{13}-2}{5}\right)\right]\left(1-\frac{(1+2)}{4(3)}\right).$$

$$A_s = (1.125)(1.8)(11)(0.9)(0.75), \text{ or}$$

$A_s = 15.05$ square inches.

Thus the area of the stabilizer in order to insure a reasonable amount of stability should be 15.05 square inches, or 21.5% of the wing area.

This value is far below the thirty per cent usually given this type of model. It is due to the combined stabilizing effects of the low C.G., the high line of thrust, the short nose and the long moment arm. Because of these helpful factors the model would fly with this amount of stabilizer area and yet have a normal amount of stability. However, this model is being designed to have exceptional stability. It is wise, therefore, to provide more area than is indicated by the formula answer. The more area given to the stabilizer over (15.05) square inches, the more stable the model will be. (17.5) square inches of area should give fine results. This amount of area will be equal to twenty-five per cent of the wing area. You will note that this is the value chosen for the stabilizer area when the approximate method of determining it was used.

If the model being designed was of the

biplane type the correct stabilizer area would have been determined by substituting the formula, the numerical values of the symbols and multiplying the answer by (0.85). (A) would represent the total area of both upper and lower wings in this case. (C) would be the average chord length of the wings.

Proportions of the Stabilizer

An average aspect ratio of a stabilizer is about *three or three and one-half*. The area is to be seventeen and a half square inches. A span of seven inches and a chord of two and a half inches would give you this area if the stabilizer was to be a rectangular surface. However, greater efficiency will result if the tips of this surface are rounded or given an elliptical shape. Thus in order to compensate for the area cut away at the four corners, the overall span should be greater than seven inches. If the tips are rounded an eight inch span will give the correct area. If the tips are made elliptical in shape a span of eight and a half inches should be allowed. The stabilizer for our model, therefore, will be eight and a half inches long and two and a half inches from leading to trailing edges, with tips that are elliptical in shape (*similar in outline to half an egg*).

Landing Gear

It is probable that many model builders think of a landing gear as performing the sole function of providing a means for the model to "take off" and land like a large plane. Actually this is only one of its less important roles. Builders who are shrewd in the art of design, use the dead weight of the landing gear to increase the stability of the model plane. Though it adds weight to the model, the landing gear can be attached to the model so that its weight is low and well forward of the center of lift. This fact helps to provide a pendulum action about the center of lift, causing the ship to recover more easily from stalls and dives. In fact the position of the center of gravity of the model may be regulated definitely by designing the landing gear to embody the proper weight and by placing it in the correct position.

In the plane we have been designing, all factors have been worked out upon the assumption that the center of gravity is *one inch* below the line of thrust, and five inches back of the propeller bearing. In such a case the struts of the landing gear should be strong enough to support the weight of the model. The choice of the strut material and its size requires a certain amount of experience to insure best results. For the model under discussion 1/32 inch diameter steel wire will be satisfactory.

The real problem starts when your selection of wheels is made. *These must be of such a weight that they will cause the center of gravity to be located at the desired distance below the line of thrust.* In this model the C.G. is to be one inch below the line of thrust and probably hard wood wheels will be necessary to provide sufficient weight. It is wise to build the model completely except for the wheels. Then place wheels of various size and material on the landing gear axles until the model balances at the point below the thrust line.

When this is done the model may balance at a point one inch below the L. of T. but this point may be ahead of or to the rear of the chosen theoretical C.G. The landing gear then should be fastened temporarily to the frame and moved backward or forward as required in order to make the actual C.G. coincident with the theoretical C.G. When the correct position is found, the landing gear may be fastened in place permanently.

In the case of the model being designed here, the C.G. lies outside the structure of the model if a stick is to be used for the body. Therefore, it will be necessary to fasten a piece of balsa wood or other material to the side of the motor stick temporarily, so that it extends down below the motor stick, and the C.G. lies within the bounds of its outline. Mark the C.G. point on this piece and adjust the weight and position of the landing gear until the model balances with the wings in a vertical position when suspended from a thread fastened to a pin inserted into the temporary piece of material you have fastened to the motor stick.

Probably our model will require 1¼" hard wood wheels, ¼" thick, in order that the C.G. will be located at the desired point, and the whole landing gear will be fastened to the motor stick about ½" from its front end. If the wheels are too light insert lead shot into them. If they are too heavy, trim down their thickness.

If the C.G. is too far forward under these conditions bend back the struts so that the wheels are located farther to the

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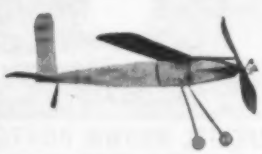
Conforms to N.A.A. weight rules and fuselage cross section. All latest features: Free Wheeling, Streamline Fuselage. A Winner. Complete kit only..... $1.45 POST-PAID



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The design of these little engines is the result of many years experience in the aircraft field. The materials used in their construction are in accordance with the best practice used in the construction of the standard aircraft engines built by leading manufacturers of engines for the U. S. Government. The workmanship is of the best. No Die Castings Are Used In Their Construction.
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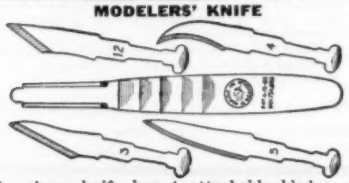

The above knife has 4 attachable blades, all remarkably keen and extremely useful in model airplane and model boat building. The holder and 4 blades come in handy box with separate compartments. Only *94c Postpaid in U.S., Foreign 14c extra.*
STUDENTS, OFFICES & SCHOOLS! We have 14 styles of blades for arts and crafts. Blades 12c each, holders 20c each. Manufactured exclusively by:

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rear. If the C.G. is too far back even with the landing gear as far forward as possible, add weight to the wheels. This may lower the C.G. but this will help stability rather than detract from it.

The Frame—Motor

This part of the model should perform the function of holding all of the other parts of the plane in their proper relative positions. The best possible design for it is always the simplest and the one which will produce the least weight.

In our stability model, a single rectangular stick will serve the purpose well. In choosing the material, lightness for the strength provided is the important consideration. A hard grade of balsa wood will be just the thing in this case.

The size is determined by the length of the model and the amount of rubber to be used. In order that the stabilizer and fin are located as planned, the stick should be eighteen inches long. The width and depth of the stick determine its ability to withstand the pull and twist of the motor. Thus these dimensions depend on the number of strands required in the motor to fly the model.

Roughly a model of this size weighing one ounce and mounting an eight or nine inch propeller will require four strands of ⅛" x 1/32" brown rubber. This will provide enough power for average flights. However, with single surface wings of sheet balsa, more power than four such strands will supply may be required. It is probable also that the model will weigh about (0.9) ounces. In this case five strands of ⅛" x 1/32" rubber, ten strands of 1/16" x 1/32" rubber or eight strands of 3/32" x 1/32" rubber should be used.

If four strands of ⅛" x 1/32" rubber is used a stick of hard balsa wood 3/16" wide by ¼" deep will provide sufficient strength. We will specify this size. If it is found later that more strength is needed, then a 1/16" thick by 3/16" wide strip may be cemented to the bottom of the stick to stiffen it.

Those who wish to take the trouble to calculate the number of strands required to fly the model and to determine the size of stick to use, may use the formula on page 45 of the October, 1935 issue of MODEL AIRPLANE NEWS. Of course the weight of the model must be known in order to do this. The only way to determine it is to estimate it, based on past experience or calculate the weight of all the parts to be used in the model. This will not be attempted here.

Every factor of design required to produce a satisfactory "stability" model now has been considered and established. The builder may proceed to design the *structure* of his plane embodying all these design factors.

A simple summary of all the design factors listed in the order in which they should be considered is given here in order to clarify uncertainties in the mind of the reader and to provide a source of data that may be easily understood and applied by the beginner. The approximate values of the factors are given as well as the exact numerical values chosen for the "stability" model. These are based on the general rules of design established by the author in this series of articles.

Outline of "Stability" Model Design

1. Span, 24 inches.
2. Chord (1/6 to 1/10 of span), 3 inches.
3. Camber (1/10 to 1/12 of chord), ¼ inch.
4. Propeller Diameter (1/3 to ½ of span), 9 inches.
5. Propeller Pitch (1¼ to 1½ times diameter), 14.13 inches.
6. Propeller Blade Area (10% to 20% of wing area), 9.01 sq. in.
7. Dihedral of Wings (½" to 2" per ft. of span, tip rise), 3½" on each wing tip.
8. Fin Moment Arm (½ span), 13 inches.
9. Distance of Prop Bearings to Center of Wing (½ to ¼ of moment arm), 5 inches.
10. Fin Area (10% to 12% of Wing Area), 7.2 sq. in.
11. Stabilizer Moment Arm (40% to 60% of span), 13 inches.
12. Stabilizer Area (for this type of model, 25% of wing area), 17.5 sq. in.
13. Position of C. of G. (distance below thrust line of (1/12) stabilizer moment arm), 1 inch.

Next month the most efficient shape of the individual parts of the model will be discussed and selected.

CONTEST WINNERS

Douglas-Designed "CONTEST GLIDER"

Baseball launchings up to an altitude of 90 ft. Glider pictured lost day after picture was taken—disappeared at about 1500 ft. alt. after 7:48 sec. Three other gliders disappeared in the blue with respective times from 10 to 13 min.

Fellows, this little plane is certainly proving itself a contest winner. Two others were officially lost in a local contest by Douglas Kruse, North West Champion. It stands baseball launchings with nary a strain and soars on the risers like a hawk.

This **Contest Glider** has a wing span of 20". The kit contains tapered and cut to shape wings, tail surfaces, and body, cement, glider polish, clay weight, sandpaper, full size 3 view drawing and complete detailed instructions. Complete Kit 85c P.P.

SPECIAL BROWN CONTEST RUBBER INCLUDED IN DOUGLAS KITS

Note! Douglas-Designed kits listed below contain glue, dope, tissue, rubber, shaped props, free wheeling prop. shafts, required machine work cut to shape and full size drawing. Other parts clearly printed on "AAA" balsa, strips cut to size and M & M Model Wheels, pontoon parts also printed on sheet balsa for the **"Space Conquerer."**

"Universal Speedster" Span 30" Length 25" Wt. 2 oz. Complete Kit with M & M Model Wheels $1.50 P.P.
"Douglas Sportster" Span 33" Length 25" Wt. 2.5 oz. Complete Kit with M & M Model Wheels $1.50 P.P.
Send for 1936 **Catalogue** of gas model supplies and everything to build rubber powered models. Complete line of M & M Model Wheels.

"SPACE-CONQUERER"

Wing span 36", length 27", wt. 2.8 oz. The new "Space Conquerer" Hydroplane, Landplane and Skiplane—all in one model—has an unofficial record of 19 min. 25 sec., 2500 ft. Altitude with M & M Model Wheels. Kit $1.75 P.P.

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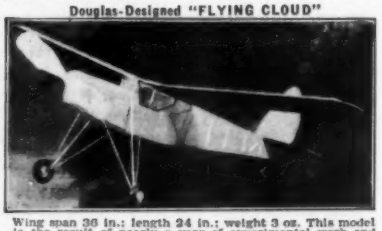
Douglas-Designed "FLYING CLOUD"



Wing span 36 in.; length 24 in.; weight 3 oz. This model is the result of nearly a year of experimental work and for consistent flying it is in a class by itself. For endurance it has again come into its own as a contest model for which it was originally designed as it passes the contest regulation in as much as it is 12 inches around the body ½ the distance back of the nose. Along with everything to build the finished model, the kit contains a semi-finished special hand carved propeller and a pair of M&M Model Wheels. Complete Kit—P.P., $1.95. Without semi-finished hand carved propeller, Complete Kit, P.P., $1.75.

Gas Lines

(Continued from page 21)

tenth places each won a set of air wheels and a medal.

The Junior Motors Corporation gave a trophy which will be given every year in the future for the greatest time of the three official flights added together, of any contestant. In other words, this shows the consistency with which any contestant can fly his gas model. The winner of this trophy at the contest was Stephen Kowalik with a total time of 16 minutes, 56 seconds.

The International Gas Model Airplane Association and MODEL AIRPLANE NEWS

wishes to extend the greatest appreciation to Mr. William Robertson, president of Hadley Aircraft, Inc., who provided the use of the airport for the contest. Mr. Robertson did everything possible to make all the contestants feel at home and to enjoy their visit to the field. Sincere appreciation is also extended to the progressive organizations which donated the prizes to the contestants. They are as follows:

Junior Motors Corporation donated a beautiful twenty-four inch silver trophy; Forster Brothers gave a Forster Brothers 1/3 hp. gas model engine; Mr. Walter Hurleman donated one of the Hurleman gas model engines which he designed; the M & M Air Wheel Company donated six pairs of especially made air wheels; MODEL AIRPLANE NEWS donated the I.G.M.A.A. trophy and ten gold medals.

No contest can be successfully run without the help of competent judges and timers. We therefore wish to thank graciously the gentlemen who acted in this capacity. They are as follows:

Mr. Bechtel of Westmont, New Jersey; Mr. Sutter of Elizabeth, N.J.; Mr. Huber of Newark, N.J.; Mr. Boonshaft of New York City; Mr. Lune of New York City; Mr. William Winter of Mattituck, N.Y., and Mr. Ernest J. Roth of Boston, Mass. Miss Mary Matlaga, president of the Battin High School Aero Club of Elizabeth, N.J., served as a very efficient recorder of the contest. Mr. McCarthy, Chief of the Plainfield Police Department, and the State of New Jersey Police Department, supplied several officers who were most helpful in conducting the contest.

Among the spectators were Mr. William Brown, designer of the Brown Junior engine and Mr. George Forster, who represented Forster Brothers company of River Forest, Illinois.

Accurately timed stop-watches, loaned through the courtesy of Polk's Modelcraft Hobbies Inc. of New York City and Newark, rendered a great service in timing the contestants' flights.

The objection which many scoffers of gas model airplanes have raised is the danger of their operation at contests where many people are assembled. This danger was eliminated by careful planning of the meet. The crowds were assembled in one part of the field and the runway was placed well out in the middle of the field, one hundred yards or more from the crowd. This fact in connection with the help of the police solved the problem.

The Association wishes to extend appreciation to Mr. Nathan Polk, who directed the contest under the supervision of Mr. Charles Grant, director of the Association. He was largely responsible for the efficient manner in which it was run off. Mr. Irwin Polk also was of great assistance in registering and weighing the models.

There was a pleasant aftermath of the contest which was passed on to us several days after the contest was concluded. Maxwell Bassett lost his gas model with which he had won many contests. Later it was found by a student of Rutgers University of New Brunswick and returned to Bassett. John Ginetti's model is still unreported as being found. It would be greatly appreciated if anyone finding this ship will immediately get in touch with MODEL AIRPLANE NEWS, 551 Fifth Avenue, New York City. The name and address of the owner is on a card which is fastened to the model.

Here is a little information concerning the pictures which appear in this column and the Association members who submitted them.

Picture No. 1 shows Gerard Smith of 398 7th Avenue, Brooklyn, New York, and his very excellent hydro gas model plane.

Picture No. 2 shows a new miniature motor mounted in a model plane which has been built by George E. Serviss of 11 South Stoneman Avenue, Alhambra, Calif. The motor was developed by C. J. Ruhland of Alhambra, shown on the right. This little motor lifted a four pound, seventy-two inch wingspread plane to a 1200 feet altitude. It develops 1/5 horsepower at 6300 r.p.m. The propeller used was fourteen inches in diameter and eight and a half inches pitch. It is said to be the lightest motor for its power yet developed in the United States.

In picture No. 3 we have something unique, 2 two cylinder in-line gasoline engine mounted in a seventy-one inch plane and built by Girard Sanderson Jr. of 1016-D-7th Street, Santa Monica, Calif. The engine is of the two cycle type with alternate firing. It has a bore of 27/32" and a stroke of 1". It develops 1/2 hp. at 4500 r.p.m. Carburation is obtained by employing a needle valve and spray jet located in the manifold leading to a simple rotary crankshaft valve. A single high tension coil is used for firing both cylinders through a distributor located on the rear of the engine. Mr. Sanderson says:

"The test flight was more than gratifying when it was flown in a twenty mile per hour wind. After the engine steadied, the machine headed into the wind, coming to a perfect three-point landing one-quarter of a mile from the take off."

Bill Gowan of 422 Ray Avenue N.E., New Philadelphia, Ohio, is shown in picture No. 4 with his KG gas job which he has just completed and flown with great success. He says it has proven to be a very consistent flier with only a few minor crack-ups, usually a broken propeller. The best time it has made so far is six minutes on three eye-droppers of gas. It is covered with regular glider cloth which provides

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60" Wingspan • Length 43½" • Weight 21 ozs.

Here is a model that resembles the real ship in every detail. Its design, performance and completeness will amaze you and its value is now even greater than before. Kit contains everything, including finished aluminum cowling, 15" prop, full size plans, etc. Colors: red and silver.

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Guaranteed to Fly 500 Ft. Was $8.50

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30" Wingspan • Length 32" • Weight 10 oz.

Nothing like this New Monocoupe kit ever offered. Full size plans and instructions are accurately detailed. Kit is complete, many parts finished, and included is a 12" prop and finished aluminum cowling. Colors: white, green and silver. Many unusual patented features.

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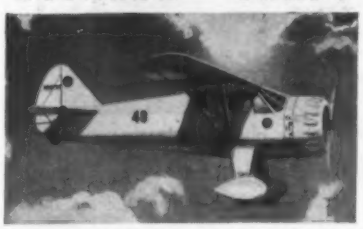

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Model V-4 (shown above) four cylinder. Weight only 3½ oz. Will fly models from 4 to 8 feet. Complete with Generator, Feed Line and Safety Clip..... $7.50

Model S-2, two cylinder. Weighs 2½ oz. Flies models 3 to 6 feet. Complete with Generator, Feed Line and Safety Clip..... $5.00

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Specially Selected Design for "IMP" TORNADO MOTORS

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Regular Price, postpaid, 50 cents. With order for an "IMP" Motor..... 25c
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Send 3 cents for New Catalogue Guide Listing lowest Prices on "IMP" Paulownia Wood Propellers, "IMP" Motors, Fittings and Specialties for Model Airplanes and Boats.

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a very tough covering. Complete it weighs six pounds, seven ounces.

Frank T. Roberts of Jamesburg, New Jersey, P.O. Box 294, sends us picture No. 5, showing his Howard "Pete" eighty inch gas job. This makes for an exceedingly fine plane of this type considering the fact that it is a low-wing.

A gas model meet was recently held at the old Dyker airport in Los Angeles, Calif. In picture No. 6 is shown a scene at the contest where a number of the gas jobs are lined up ready for a take off. Mr. Maclin Benagh Jr. of 1725 Bank Street, South Pasadena, Calif., has been kind enough to send it to us. Mr. Benagh says the one in the foreground was an extremely fine flier.

Jack Schwartz of 1742 North Peach Street, Philadelphia, Pa., favors us with a very unusual picture, No. 7, of his gas model just after it has taken off. It is an actual picture of the machine in flight, not faked. The attitude of the ship in the air shows it is unusually stable.

Paul Zakim of 807 Riverside Drive, New York City, believes in super-aerodynamic lines. Picture No. 8 shows his gas job taken from a point close to the nose. The details of its fine construction show the care to which Zakim has gone to make this ship efficient.

Peter Butrus of 516 North Delaware Avenue, Atlantic City, New Jersey, writes and sends us picture No. 9, showing him holding his Monocoupe gas plane. It has a six foot wingspread and weighs 5½ pounds complete. It is entirely built of Calif. sugar pine. Should we say that this is a "sweet" job?

Another fine flight picture, No. 10, has been sent to us by Chester Chaplaskie of 671 Third Avenue, Brooklyn, New York, and it shows his seven foot, five pound fuselage job coming in on a glide. One-eighth inch spring steel piano wire makes the landing gear so that "it can take it."

In picture No. 11 Frank C. Smith Jr. of 803 Lovett Blvd., Houston, Texas, is shown holding his "California Chief" powered with a Baby Cyclone engine. Though this is a small job it is a very fine flier. He says the engine gives a continuous run of thirteen minutes without a miss.

T. Jennings Tinsley of 1460 Irving Street N.W., Washington, D.C., sends us picture No. 12, showing his second experimental model. He says it is still in perfect condition and has made a total of sixty-five flights and has been five hours, forty minutes in the air with only two minor crack-ups. It weighs five pounds, six ounces and has an eight foot wing span.

Here is a helpful hint for gas model builders and others who wish to be aeronautical engineers. Mr. Willis L. Nye, who has contributed so many fine drawings to MODEL AIRPLANE NEWS, has recently published a book on metal aircraft design and structure. Various phases of metal aircraft construction, outlines and materials required and handled in a very lucid and concise manner. Examples and methods of fabrications, wings, tail areas and miscellaneous parts render clear pictures of the latest practices in metal construction. We congratulate Mr. Nye on his work.

A number of members have written to us requesting that an International Gas Model Airplane Association pin be made and sold to the Association members. Serious thought has been given to this. Will members not please write in to us and tell us whether or not they would like such a pin. The charge will be twenty-five cents.

If enough members wish these emblems they will be made immediately.

The Association has decided to give license numbers to models of its members. A license number will be as follows: IGM-1-5-A. This is a sample number meaning: International Gas Model Airplane Association model belonging to a member of Unit No. 1, the member's number is 5, and A represents the number of the model registered under the member's name.

All members who wish license numbers will please write in for them immediately and numbers will be assigned.

Mr. Robert K. Allen of 718 Wood Street, Wilkinsburg, Pa., deserves the credit for first suggesting that planes be assigned license numbers. He has one of the most active groups in the country and has now organized three additional groups under his unit, total membership being in the neighborhood of sixty. We suggest that the other units get busy and enroll some new members.

Air Ways—Here and There

(Continued from page 27)

used balsa wood and Jap tissue that I managed to get the prizes."

Mr. Jones is to be commended for his modesty as well as progressive spirit. He continues by saying that most of the other planes entered in the contest were

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F 14 Howard Mike
F 15 Curtiss Robin
F 16 Puss Moth
F 17 Fokker D 8
F 18 Polish Fighter
F 19 Curtiss Hawk
F 20 Fairchild 22
F 21 Stearman Fighter
F 22 Vought Corsair
F 23 Akron Fighter
F 24 Boeing P-12
F 25 Corbin Super Ace
F 26 Martin Dive Bomber
F 27 Boeing P 26 A
F 28 Mr. Mulligan
F 29 Aeronca
F 30 Kinner Envoy
F 31 Consolidated P 30
F 32 Ryan Sportster
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N 3 Stearman Fighter
N 4 B/J Navy Fighter
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N 6 Beecheraft
N 7 Stinson Reliant
N 8 Sikorsky S-42
N 9 Monocoupe
N 10 Bellanca
N 11 Douglas Observation
N 12 Aeronca
N 13 Supermarine
N 14 Curtiss Hawk
N 15 Boeing Pursuit
N 16 Akron Fighter
N 17 Vought Corsair
N 18 Auto Giro
N 19 Lockheed Vega
N 20 Wedell Williams
N 21 Lockheed Sirius Seaplane
N 22 SE-5A 1918 Fighter
N 23 DeH 4 1918 Fighter
N 24 Spad 1918 Fighter
N 25 Corbin Super Ace
N 26 Martin Dive Bomber
N 27 Martin China Clipper
N 28 Mr. Mulligan
N 29 Curtiss Wright Amp.
N 30 Kinner Envoy
N 31 Consolidated P 30
N 32 Ryan Sportster
N 33 Laird Sesquiplane
N 34 Seversky Pursuit
N 35 Fairchild 45
N 36 Grumman Fighter

constructed of bamboo and pine and covered with balloon cloth. A model of this variety, entered by N. Lawrence, was exceedingly well made. All of the prizes were presented by the DeHavilland Aircraft Company of South Africa.

Since the contest Mr. Jones says that everybody has been using balsa in the construction of their ships. The best flight that he has every obtained was with a Curtiss Robin scale model which flew for sixty seconds. Recently he made a flight of thirty-five minutes with a Bob File glider.

Just to show that models do fly in South Africa, Jones sends us picture No. 10, showing his flying scale Monocoupe in actual flight. Not only is the model evidently a fine flier but the picture is very well taken. The Air Ways Club wishes him the best of luck in the future.

CLUB NEWS

New York

The Challenger Model Aero Club of 192 Clymer Street, Brooklyn, New York, recently held a contest. Picture No. 11 shows Robert J. Keegan, one of the ace model builders of the club, and his latest creation, a fine modern commercial. Unfortunately at the contest the ship flew out of sight on a non-official flight. It could be seen for six minutes, thirty-two seconds. The first place in the contest went to Oscar Paul, with a flight of five minutes, forty-four seconds. His job also disappeared. The stick event was taken by Robert Keegan with a flight of one minute, forty-seven seconds. He used a twin pusher which was ancient and worn to accomplish this.

Florida

Flight Squadron No. 239 of the Junior Birdmen of Foot Avenue C, Fort Pierce, Florida, held its first Hand-launched Glider Contest at the Fort Pierce Airport on March 21st. Though the contest was run on a small scale it was very successful and inspired the young men to greater things in model building. Mr. Radinsky, secretary of the Fort Pierce Chamber of Commerce, David Binney Putnam, manager of the Ft. Pierce Airport, and Clate Weavor, pilot instructor for the Ft. Pierce Flying Club have been a great help to the Squadron.

Picture No. 12 shows a group of members with some of their planes. You will notice in the lower right corner that though this club is young, one of its members is the proud owner of one of the most advanced types of contest ships. One of the members, while demonstrating to a group of younger model enthusiasts, sent his model up for an unofficial flight of seventeen minutes, forty-five seconds. Though the model circled over a very wide area it landed within a very short distance from where it was launched.

Irvin Sweet, who is Commander of the club, shown in the lower right hand corner of the picture, thrilled onlookers with a flight of three minutes. We are indebted to Mr. George A. Stewart and George S. Backus, sponsors of the Squadron, for this interesting information.

New Jersey

John Czajkowski of 12 Arlington Avenue, South River, New Jersey, an Air Ways Club member, has been building models for two and a half years. To date he has made sixty-five ships. He belongs to and is Secretary of the South River High School Model Aero Club, which is also a unit of our Air Ways Club. Mr. Froude is Supervisor of the Club. Though the membership is not large the club has been in existence since 1933 and is turning out some fine work.

Recently Czajkowski launched his tow-line glider for a flight that ended in the clouds after remaining in sight for thirty minutes.

A group of members of the Club is shown in picture No. 13 with an array of their models spread out before them.

We hope to hear more of this active unit.

California

Ralph Guernsey of Posey, California, a good member of the Air Ways Club, has written us making several suggestions. He asks us if we will not please give the older fellows a "break." He says:

"I don't mean for them to compete against youngsters, but I do think we should be represented in all contests. In the scale model events I think there should be two divisions; the juniors up to sixteen years of age and the senior division from sixteen years."

We are now making up the rules which will govern the Air Ways Club and its contests. Therefore we hope that all Club members will write to us and give us suggestions. Many fellows have ideas on how a club and a contest should be run. Inasmuch as this is a club for the members, we want them to give us their ideas concerning this phase of model aviation. It is suggested that club members in any vicinity get together and form a unit, or if there is a model airplane unit in their vicinity, they join the Air Ways Club as a unit.

CONTESTS

New Jersey

The Eastern States Indoor Contest was held at the large Lakehurst Hangar at

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IDEAL Model Ship Building CONTEST

WOULDN'T you like to take a trip to Europe, absolutely free, on the Superliner QUEEN MARY! Or could you use $50.00 in cash money? These are only two of the wonderful prizes in this IDEAL Model Ship Building Contest. Celebrate the arrival of QUEEN MARY by building this 18 in. Model of the world's largest ship. It's an accurate realistic Model designed with the cooperation of the builders of the real ship, with all details and beautifully decorated in actual colors. Anybody can do it; no model ship experience required. Just get the

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2 Free Trips to Europe on the QUEEN MARY Cabin and Tourist Class
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Beautiful Trophy Cups.
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IDEAL Official 18 in. Contest Construction Kit $1.00

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With one-piece Redi-Form" Hollow Hull

Kit contains every item required to complete the Model, including the IDEAL "Redi-Form" Hollow Hull; molded to exact shape and ready for mounting decks. Deck details printed on balsa wood, ready to be cut to shape and mounted on hull. Enclosures for promenades, bridge, and other superstructure clearly printed on cardboard, with windows, ready to cut out and attach. Ready materials for funnels, masts, booms, deck housings and other details. 23 cast metal life boats with davits; 2 metal anchors; 4 brass propellers; cement, colored lacquer, sandpaper. Large Plan, full size of Model, showing every operation, with 40 "close-up" diagrams and 10 photos of details; also complete instructions for building, outfitting and decorating the Model.
Get your Kit and start now. Entry blank, Contest Rules and all information packed in each Kit. Ask your dealer, or send the coupon below and get started now.

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Lakehurst, New Jersey. Mr. Nathan Polk, its director, gives an account of it which is as follows:

"Handicapped by adverse conditions though flying in one of the best buildings in the east—the Lakehurst hangar, nearly 75 model builders from as far north as Canada and as far south as Washington, D.C., competed for the Eastern States Indoor Model Plane Championship on April 25th. Cold weather and the fact that the Los Angeles and a blimp were in the hangar prevented better duration although it was still better than any armory.

"The highest time of the day was made by Bruno Marchi of Medford, Mass., who flew his model for 20 minutes, 6 seconds; winning first place in the Stick Model Event. Mayhew Webster and William Wert of Philadelphia, Pa., won second and third places in this event with flights of 19:25.6, and 19:03.2.

"Ervin Leshner of Philadelphia won the Cabin Event with a flight of 11 minutes, 42⅝ seconds, and Herbert Greenberg was a close second with 11 minutes, 21 and ⅜ seconds. Greenberg was one of the New Jersey representatives. Walter Lees, another Philadelphia boy placed third. His model flew 10 minutes, 3 seconds.

"In the Baby R.O.G. Event, Merrill Malley of Atlantic City came near his own National record of 10 minutes, 56 seconds with a flight of 10 minutes, 41.8 seconds. Mayhew Webster and William Lutz, both from Philadelphia, placed second and third in this event. Their models flew 9:43.2 and 9:39.4.

"Prizes consisting of silver trophies, gold and bronze medals and magazine subscriptions were awarded those placing first to thirteenth in each event. The meet was conducted by the newly organized Metropolitan Model League and was directed by Nathan Polk. It was sanctioned by the National Aeronautic Association and conducted according to Association rules.

Rear Admiral Ernest J. King, chief of the Bureau of Aeronautics and Commander Charles E. Rosendahl, commandant of the Naval Air Stations were keenly interested spectators. Lieut. H. W. Alden, Chairman of the N.A.A. Model Plane Committee, attended as official observer."

Another contest which will be sponsored by the Metropolitan Model League will be held July 18th at Newark Airport for the New Jersey division, and on July 25th at Van Cortlandt Park or Holmes Airport for the New York division. Model builders wishing information about the League or its contests should get in touch with the headquarters in their vicinity; in Newark at 263 Halsey Street and in New York City at 421 Seventh Avenue.

Pittsburgh

Outdoor flying has started in the city of Pittsburgh. A contest was held there recently at the Wilkinsburg Airport, which was directed by Mr. Robert K. Allen of 718 Wood Street, Wilkinsburg, Pa., and sponsored by Gimbel Brothers of Pittsburgh. Mr. Allen writes:

"On a day that certainly wasn't meant for an outdoor contest, approximately 100 hardy contestants gathered at the Wilkinsburg Airport for the FIRST Outdoor competition held in the Pittsburgh Area. Gimbels Club eliminations for the N.A.A. Nationals is half completed. It was plenty cold and windy, but due to the lack of time between now and June 29th, it was imperative that the first contest be held.

"I can truthfully say that I have never seen so many props broken in one contest in my life. A great number of boys didn't get a chance to take an official flight because of breakage during tests, but I believe it taught us a valuable lesson—to BUILD ALL-WEATHER MODELS. Some of the boys had beautiful models out, but they 'couldn't take it.'"

"Only four contestants completed three officially timed flights and the results of these flights are as follows:

	Stick		Fuselage	
	D	C	D	C
Phil Weatherwax	.....	278	.....	.....
Alex Landis	.....	38	.....	167
Clem Turansky	104	108	171	147.5
Joe Boyle	194.5	152	.....	.....

New York

The National Aero Reserve of 114 West 16th Street, New York City, will conduct an outdoor contest in one of the city parks in Rochester, New York, on July 11th, for the benefit of the local members. Details and rules will be given in the "Rochester Times-Union" for the benefit of those who wish to enroll.

Massachusetts

News comes from Boston concerning

M & M GAS MODEL WHEELS at NEW LOW PRICES

EFFECTIVE AT ALL DEALERS

SIZES 3½"x1⅜" ..... $3.50 Pair
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1¼—1¾—1½—1⅝"—Wt. approx. 1/10 oz. pair.
PRICE $0.50 Per Pair Postpaid.
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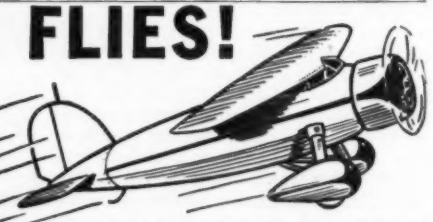

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the New England Championships. Mr. Al Lewis, editor of "Wing Overs," writes as follows:

"More than twenty gleaming silver cups and trophies and dozens of expensive model airplane kits await the winners of the Annual New England Championship Model Airplane Contest to be held this year on June 6 and 7.

"The indoor events will be run off on Saturday, June 6, inside spacious Boston Garden. Events will include Gliders, hand launched, Class A and B; stick type R.O.G., Class A and B; Fuselage R.O.G., Class B and C; stick type hand launched endurance, Class B and C.

"The outdoor brawl will be at Harvard Practice Field, directly opposite Harvard Stadium, Cambridge, Mass., the next afternoon, Sunday, June 7. Outdoor events will include stick type hand launched, Class C and D; Fuselage R.O.G., Class C and D; Gliders, hand launched and tow-line launched. These two types of gliders will not be competing against each other.

"This meet is held each year by the Jordan Marsh—Boston Traveler Junior Aviation League. Entrants come from all the New England states, and all readers of MODEL AIRPLANE NEWS living in Maine, New Hampshire, Vermont, Connecticut, Rhode Island, or Massachusetts are invited to compete. A letter addressed to: Junior Aviation League, Jordan Marsh Company, Boston, Massachusetts, will bring full details of the two-day contest."

New Jersey

Dunellen, New Jersey, now has a model aero club. J. E. Kelley, president of the club, with headquarters at 306 Mount View Terrace, Dunellen, New Jersey, writes and says:

"Our club is entering its second year of existence. The club receives your magazine and we find it very satisfactory.

"We have an enrollment of twenty-three members. We have held several successful contests. The club is now preparing to enter a contest given by the Efinger Sport Store in Bound Brook, and we hope to win as many events as we did last year.

"Most of the members have been building flying and scale models. We are planning, in the near future, to build a "Flying Flea" light plane. Financial difficulties are stopping our building it at present."

Illinois

From Chicago, Illinois, word of the "Aeronuts Bulletin" comes to us. This is a new publication which is being edited by J. Jenkins of 1208 Foster Avenue. The secretary is T. Cunningham of 1039 Hollywood Avenue. Both these gentlemen are residents of Chicago.

We cannot help but sense the spirit of Carl Goldberg permeating somewhere in the vicinity of the editorial offices.

It is an exceedingly fine little sheet and contains some interesting news, as you might imagine, on high performance models.

Elizabeth, N.J.

Model builders living in Elizabeth can now join a model flying club. One was recently organized by Vincent Mottershead of 1486 Long Avenue, Hillside, N.J. The club is called Flying Comets, and at present there are about nine members. The officers are: Frank Ropis and Vincent Mottershead as Captains.

Air Defense League

American youth will unfold its wings and take to the air in one of the most extensive movements for the stimulation of aviation in the history of flying with the organization of the Air Defense League, Inc.

Not only will America be supplied with a sufficient reserve corps of experienced fliers in the event of war, but the youth of the nation will be given its first great opportunity to follow a profession which has developed rapidly in recent years.

Articles of incorporation for the League were filed with the Secretary of State of Indiana, at Indianapolis, Sept. 21st. Plans for enrolling air-minded boys throughout the nation for the purpose of teaching them to fly were launched immediately afterward.

Indianapolis has been selected as national headquarters for the organization and the first flight groups will be formed in that city. Organization work will follow throughout Indiana and as rapidly as possible will be spread to other states until all parts of America are represented in the membership.

Boys between the ages of 15 and 21 years will be eligible for membership.

Terre Haute, Indiana

There is now a Terre Haute Model Airplane Club. The membership at the present time is close to 200 boys, although it was just recently organized. Meetings are held every Monday afternoon at 4 o'clock at the Whitlock Sport Shop, 522 Wabash Ave., Terre Haute, Ind.

Wisconsin

At Stevens Point, Wisconsin, there is a progressive model club called the Central Model Airplane Club, which though small is active. It is one of those clubs which is held together by the intense interest of the members. It is possible that we will

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Most Popular Ever Built!

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NATIONAL'S NEWEST and LARGEST FLYING SCALE MODEL

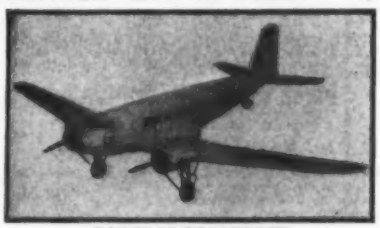
"Taylor Cub"

Just in Time for Long Outdoor Flights

Wingspan 52½" Length 32" Weight 8 ozs.

COLORS: RED AND WHITE

A perfect 1½" miniature of this most popular sport plane, designed for easy, quick construction and marvelous flights. Kit contains full size 3-view plans and detailed instructions, all spars and longerons to full length —28 wing ribs, nose block and propeller, semi-finished. New shock-absorbing landing gear, finished wheels, metal parts, rubber motor, tissue in colors, cement and dope. No extras to buy..... $1.50 Plus 25c Postage



DOUGLAS TRANSPORT

Faithfully detailed 1-2" scale model of the famous transport, the "Pride of the National Line." The kit includes: turned motor cowls; nose block and wheels, 3-bladed props, (flying and scale); printed balsa parts; flexible shaft gearless transmission; headlights; windows; doors that open; cement; colored dopes and many other features—3-view full size plans and instructions.
Wingspan 42½"; Length 29¼"; Weight 8 oz. Plans only $1.00, plus 15 postage. **$5.00** Plus 50c postage

NEW BEECHCRAFT A-17-F

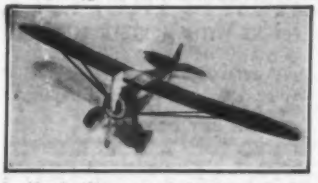
Authentic 3-4" scale model of the popular 4-seater cabin plane. Kit contains many simplified National features; turned cowl and wheels, safety motor tube, etc. Colors are red and black, silver trimmed.
Wingspan 23½"; Length 18"; Weight 2½ oz. Plans only 50c, plus 10c postage. **$2.50** Plus 25c postage

CHINA CLIPPER

Wingspan 16.25"; Length 11"

Here is another new sensational National creation that has taken hold almost over night. Nothing we say here could fully describe this magnificent exhibition model of the famous Martin China Clipper, an authentic ⅛" scale solid model. In every detail a beautiful miniature. It is easily built from National's full size 3 view plans with accurate instructions. Its colors are gleaming silver and black with red wing panel. The 4-3 bladed cast metal props give a realistic touch. Kit comes complete with cast display mount..... **$1.00** Plus 15c postage

NEW ½" FLYING-SCALE MONOCOUPE



New ½" Scale Model. Span 16.5"; Length 10.75". Weight ¾ oz. Colors, Red, black trim. Realistic and a thrill to fly —

Also in this group: Corben Super Ace, Curtiss Robin, Heath Parasol, Fokker D-8, Puss Moth. **25c** (Plus P. P. 10c.)

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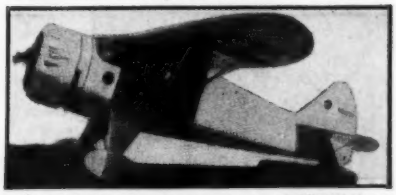
GAS POWERED! (AC:CO)

COMPLETE KIT INCLUDING One-Twelfth Horsepower Motor **$12.50**



49" HOWARD RACER "MR. MULLIGAN"

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hear more from these young men in the future.

Correspondents

Following are some more boys who would like to correspond with other model builders. Why not write them?

G. L. Caron, 944 Davaar Avenue, Montreal, Quebec, Canada.

Robert Kistler, 139 East Ridge Avenue, Bloomsburg, Pa.

Arnold Searson, Raphine, Virginia.

Henry W. Schab of 1013 Brunswick Avenue, Trenton, N.J.

Otis Leist, Jr., of 415 South Walnut Street, Van Wert, Ohio.

Kenneth Perkins of 333 76th Street, Brooklyn, N.Y.

Eugene McCaulou, Box 286, Toledo, Ore.

If anyone is interested in obtaining a complete set of MODEL AIRPLANE NEWS magazines we suggest they get in touch with J. V. Chvala of 5151 South Whipple Street, Chicago, Ill.

(Continued on page 48)

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The Air Ways Club

Write for Information and Application Blank

MODEL AIRPLANE NEWS

551 5th Ave., N.Y. City

Aviation Advisory Board

(Continued from page 19)

have a tendency to be directionally unstable as well as to "spin". The position of the center of lateral area or directional center should be to the rear of the center of gravity, a distance equal approximately to one-fourth the distance from the center of the wing to the center of the stabilizer.

One of the greatest existing faults in gas model design at the present time is that model designers construct their ships so that the directional center is a considerable distance above the center of gravity. The effect of this is to produce a spiral diving tendency when the nose of the ship drops slightly and the speed increases while the model is turning.

The reason for this is that in a turn the model skids sideways away from the direction in which it is turning. This causes an air pressure on the side of the model. If the center of this air pressure is above the center of gravity to any extent it will push the top of the model towards the center of the turn causing excessive banking. Under these conditions the nose of the model will drop, thus increasing the speed and causing the model to nose in toward the ground. This fact further increases the speed of flight, which in turn causes a greater side air pressure on the model.

In other words, one action helps to build up the other in a regular cycle until the bank becomes excessive and the model spirals sharply into the ground. Usually this condition exists in gas models where the motor and batteries are located close to the lower side of the fuselage, as in cases where they are mounted on the lower longerons. Such models will fly well as long as the nose remains pointed skyward. As soon as the plane noses down slightly, trouble begins.

The center of lateral area should be approximately on a horizontal line with the center of gravity; at the most, very slightly above it. Ships built like this will perform perfectly. An outstanding example are ships built by Gerard Smith of 398 7th Avenue, Brooklyn, New York.

In order to insure the correct position of the directional center in an up and down direction, keep the weight of the motor and batteries well up towards the upper part of the fuselage and belly down the fuselage in order to create side area below the weight, especially where excessive dihedral is used. In order to get a low center of gravity relative to the center of pressure, designers may "parasol" the wing above the fuselage. This raises the center of lateral area to a certain degree, but it raises the center of gravity in a greater proportion.

Roberta Harmon wants to know the following. We do not know Miss Harmon's address.

Question: Where can information be obtained which gives complete data on model building from the beginning?

Answer: Probably one of the best courses in model building was published in issues of MODEL AIRPLANE NEWS. The series began with the May 1934 issue and ran continuously through the May 1935 issue. The series was entitled "Fundamentals of Model Airplane Building."

Question: How is the center of pressure of the wing of a model sailplane determined?

Answer: The only way to determine the center of pressure of the wing is to have a center of pressure chart of the airfoil section of the wing and to determine the point at which the center of pressure is located on the chart when the wing is at the angle of incidence desired.

The angle of incidence on the glider is the angle of the wing chord line to the stabilizer chord line. If the wing is swept-back or tapered, the center of pressure at various points along the wing span should be marked, a line drawn from this and the center of pressure of each wing half determined by locating the center of area of each wing half, will be approximately the center of pressure of the surface. The center of pressure of the airplane will then be at the center of the line joining

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the center of pressures of the two wing halves.

Question: Does the weight rule apply to tow-launched gliders in National Aeronautic Association contests, as it does to fuselage models?

Answer: Yes, all gliders not up to the weight rule should be weighted sufficiently to bring their weight up to the proper amount.

Question: Does Mr. Sikorsky design every detail of the structure of his ships?

Answer: I do not know positively the procedure which Mr. Sikorsky follows in this matter. However, it is extremely likely for an engineer of Mr. Sikorsky's position to outline the design and general structure and leave the detail design to his engineers. Probably he checks such details when they have been completed.

Here we have two questions from Wilfred Rudd of "Leonora," cnr. Chesterfield Road and Victoria Street, Epping, New South Wales, Australia.

Question: What do the letters T.W.A. stand for?

Answer: They stand for Transcontinental & Western Air, Inc.

Question: How does a radial engine work?

Answer: This is a pretty large order and it suggests that Mr. Rudd does not fully realize the details required in such an explanation. Volumes could be written on this subject alone. We suggest that he visit some library in his vicinity and read over such books on aviation in which this information might be found.

Question: What date and what year was Richthofen killed?

Answer: Richthofen was killed on March 22, 1918.

Donald Rodewald of 405 7th Street, Baraboo, Wisconsin, requests the answers to the following questions:

Question: What is the best way and how do you cover a model with silk?

Answer: We suggest cutting a paper pattern of the part or section to be covered. If it is the wing, half of the wing should be covered at a time and a pattern of one-half of the wing should be made.

Cut the silk to this pattern, allowing a small overlap on all edges. The threads in the silk should run parallel to the chord and the lateral axis of the wing. To apply the silk to the frame, cover a small section of the frame with cement, starting at one end or at the center of the wing. Press the silk down to the frame and keep it in place until the cement has dried sufficiently for you to proceed with the next section.

Do not turn down the overlap until after the whole wing has been covered and then press the edges of the silk down to the frame.

Question: With what do you dope silk?

Answer: Silk should be doped with ordinary airplane dope. It should be given three or four coats, the last coat may be of a colored dope if you have planned some particular color scheme for your plane. Sometimes resin is used to fill the pores of the silk before the dope is applied. In this case two coats of dope will be sufficient.

Question: What grade of music wire is used to wind a compressed air tank?

Answer: Steel wire 1/64" in diameter may be used. The spacing between each winding or looping should be about 1/16", at the most not more than 1/8".

We have a question from Billy Blakemore of Box 182, Manassas, Virginia.

Question: Can a scroll saw be used in cutting balsa parts?

Answer: Yes, it can be used very efficiently.

Question: What is the purpose of the second wing on the "Flying Flea"?

Answer: This wing in combination with the front upper wing creates a stabilizing effect. Actually it functions as a stabilizer and as a lifting surface.

Stuart Phillips of Henry, Illinois, wants to know:

Question: Was the plane in which Wiley Post and Will Rogers killed an Orion?

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White and all colors ..... 2 for .05

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1x1 1/2x12	1 for .08
1x1 1/2x15	1 for .09

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SEE PAGE 1

BERKELEY GAS MODELS .... Real Airplanes in Miniature

FLASH! *A "Cavalier" set an I.G.M.A.A. record for model builders under 21, at the first I.G.M.A.A. contest, sponsored by Model Airplane News at Hadley Field, New Jersey, May 9th.*

Do not confuse these models with "enlarged rubber-powered models." Berkeley Gas Models are designed exclusively for use with miniature gas motors. They positively cannot be flown with rubber, compressed air or dry ice motors.

Wingspan 7 ft. 4 in.; Weight without motor 3 lbs. 6 oz.

The "BUCCANEER"
A simple, durable model with smooth clean lines. Even beginners can get real flights with this model.
COMPLETE MATERIALS:—Including Brown Jr. Motor, M. & M. Wheels, colored dope, cement, and all parts to complete the model (as pictured). $29.50 Postpaid in U.S.A.
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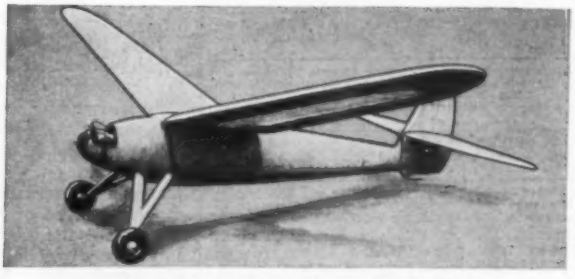

Wingspan 9 ft. 0 in.; Weight without motor 3 lbs. 12 oz.

The "CAVALIER"
The strongest gas model ever built. Clean lines, excellent design and light wing loading make this ship a sure contest winner.
COMPLETE MATERIALS:—Including Brown Jr. Motor, M. & M. Air Wheels, silk for covering, colored dope, and all parts to complete the model (as pictured). $36.00 Postpaid in U.S.A.
Complete Materials without power plant $16.00
Plans only (to build the "Cavalier") ..... .50

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Answer: This plane was no standard model. It was made up of an Orion body with special wings and floats. It was rebuilt by Wiley Post. It is possible that this fact was the fundamental cause of the death of the two pilots. It is interesting to consider the fact that Wiley Post was not used to flying pontoon ships. His automatic reactions as a pilot were attuned to a land job, rather than to a hydro.

Thomas Clifton of Blackstone, Virginia, asks the following questions:

Question: Please give me a few checking points to use in designing a model.

Answer: We suggest that you read the articles by Mr. Grant, starting with the February 1936 issue. These will undoubtedly answer all your questions.

Question: What type of models give the most noteworthy flights?

Answer: Specially designed contest models naturally will out-perform all others. In such models only those parts are included in their structure which are required by the contest rules and demands of performance. Some of the characteristics of these ships are:

Long motors, large propellers, large tail surfaces, parasol or high wing and as small a body structure as possible. Usually the landing gear is long and reasonably light. This latter quality is a practice adhered to by many model builders, but however does not always give the most satisfactory results, in our opinion. A heavier landing gear placed well toward the nose adds to the stabilizer to such a degree that the average angle of attack throughout the flight is more efficient. This means that the average $\frac{L}{D}$ for every second of time of the flight is high.

Question: Is a compressed air engine very satisfactory?

Answer: This question naturally brings forth the remark—"satisfactory for what"? As a rule such engines are not satisfactory for contest work. They are satisfactory for those who wish to build larger models and models which resemble in form and function a large ship.

Question: What should the area of the stabilizer and rudder be on a single stick pusher?

Answer: The stabilizer or front wing of a pusher should be approximately one-third of the area of the rear wing. Stability may be obtained very readily in a single pusher by raising the front wing above the stick an amount equal approximately to three-quarters of the chord. If the chord is two inches, it should be raised one and a half inches from the stick, measured from the center line or the center section of the front wing, to the stick. The rudder on a single propeller pusher should be beneath the wing and of an area equal to about one-tenth the wing area. In effect, it is not a rudder but a fin.

A single propeller pusher is not like the twin pusher in this respect, for in a twin pusher the rudder is not necessary. However, in a single pusher the fin or "rudder," as Pearlman calls it, aids in forcing the model into a bank or turn which allows the "single" pusher to spiral in such a way that stalling and rolling is prevented, which is often caused by the torque of the single propeller.

Well, that is all for now. See you next month.

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ONE OF Long Island's pioneer airplane builders seeks backing by reliable party for the manufacturing of light planes. A. C. Heinrich, 121 Seaman Ave., Baldwin, L.I.

Air Ways—Here and There

(Continued from page 46)

Russia

Here is some late news from Russia which will indicate how model builders are progressing in that country.

Special winter contests were run off this past winter for the first time. Comr. Babayev, head of model airplane activities carried on by Osoaviachim, stated that winter tournaments would become a regular feature of Soviet model activity throughout the USSR. This year performance of models equipped with skiis was emphasized. The main prizes went to models in this class.

This coming June 1st is the closing date for the All-Union competition for the best miniature gas engines. This competition was started Dec. 1st, 1935. Contestants are required to submit complete motors accompanied by detailed working drawings and description of the technological processes involved. All motors must be suitable for mass production. For the best motors the following prizes will be awarded:

1st	10,000 Rubles
2nd	5,000 Rubles
3rd	3,000 Rubles

The right to award additional prizes for separate valuable features found amongst the motors is reserved for the judges. The designers of the winning motors shall have all the rights provided by Soviet patent laws. These engines will enable Soviet model builders to continue their progress in model building and enable them to reach the highest technique in flying models, that of building and flying gas models.

Canada

John T. Dilly of 28 Blenheim Road, Galt, Ontario, submits the official Canadian Model Airplane Records which we present here as follows:

INDOOR

CLASS A. STICK. (Baby R.O.G.)

Junior: Clarence Dunn, Hamilton, Ont., 4 min. 19 secs.

Senior: Ernest Houslander, Hamilton, Ont., 8 min. 34 secs.

Adult: Ted Booth, Hamilton, Ont., 5 mins. 27 secs.

Hand-launched Stick (30-150 sq. inches).

Junior: Don McIntyre, Guelph, Ont., 5 mins. 43 secs.

Senior: Harry Burrows, Toronto, Ont., 17 mins. 14 secs.

Adult: John T. Dilly, Galt, Ont., 7 mins. 3 secs.

Fuselage R.O.G. (30-150 sq. inches).

Junior: George Reed, Toronto, Ont., 3 mins. 56 secs.

Senior: Albert Levy, Toronto, Ont., 8 mins. 56 secs.

Adult: John T. Dilly, Galt, Ont., 3 mins. 14 secs.

Flying Semi-scale.

Junior: Jack Barton, Weston, Ont., 1 min. 46 secs.

Senior: Melvin Bardsley, St. Catherines, Ont., 1 min. 46 secs.

Adult: R. Frier, Toronto, Ont., 2 mins. 13 secs.

Hand-launched Glider.

Senior: Ernest Barrie, Galt, Ont., 33 secs.

OUTDOOR

Hand-launched Stick.

Junior: Jack Purvis, Toronto, 5 mins. 20 secs.

Senior: Victor Davey, Winnipeg, Man., 5 mins. 41 secs.

Fuselage R.O.G.

Junior: Jeff Noble, Toronto, Ont., 49 secs.

Senior: Ross Farquharson, Vancouver, B.C., 3 mins. 40 secs.

From this list you can see that Canadian boys have been extremely active. It appears that they prefer indoor contest. Considering the lack of height of the ceilings in the halls in which they fly, the times are excellent.

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. . . or one of 10 FREE 1000-MILE TRIPS *in Megow's new PRIZE CONTEST*

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Here is all you have to do. Give us your suggestion for making a new Megow model, or for improving the Megow Kits from which you now build your favorite models. Write your suggestion in words, or draw it in complete sketch form. The eleven most valuable suggestions win. Read the rules of the contest. Send for a 20 page complete catalogue of Megow Kits.

• 1000 OTHER PRIZES •

RULES of THE CONTEST

1. Give us your suggestion in 200 words or less—or by a complete and detailed drawn sketch—for a new Megow Model or suggest how Megow can improve the Kits now being made.

2. Do not build or send a model.

3. Each suggestion entered in the contest must be accompanied by the ends of cartons from 3 DIFFERENT Megow Kits.

4. All suggestions entered become the property of Megow Model Airplane Shop.

5. Prizes to be awarded for the best and most practical suggestions as follows:

FIRST PRIZE — Coast-to-Coast round trip by regular TWA Airliner.

NEXT 10 PRIZES—Round trips on TWA Airliners, each equal to 1000 miles of travel.

1000 PRIZES — Fifty-cent solid model airplane Kit made by Megow Model Airplane Shop.

Every entry will receive a copy of Megow's new book "The A.B.C. of Model Building.

6. Each entry must be accompanied by name of dealer from whom models were purchased—or by the name of a dealer in your town from whom you want to buy Megow Models.

7. Judges decisions are final.

8. All entries must be postmarked before midnight August 31, 1936. Winners will be notified by September 15th.

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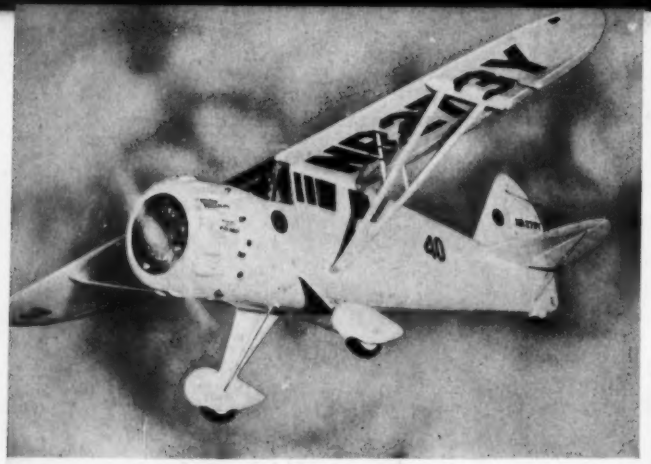

"MISTER MULLIGAN"

1935 WINNER OF THE THOMPSON TROPHY

This plane was reputed to be the fastest cabin plane made at the time it won the Thompson speed classic and it proved itself by flying over 220 M.P. H., winning the coveted trophy for 1935. Model exterior as detailed as the prototype and all white with gold lettering and black trim. Material supplied for both authentic motor with cowl and dummy fronts—take your choice. Balsa, not paper covered, where necessary to simulate plywood or metal. **No other Mulligan will ever be like it for your Thompson lineup.** Absolutely complete with printed wood kit SF-52 postfree..... **$2.95**

DeHAVILLAND "COMET"

Prototype won MacRobertson 11,300 mile England to Australia Race in 71 hrs. Model is high speed flyer, pulled by 2 powerful little motors. Extraordinarily beautiful. Span 22". Kit absolutely complete (but NO LIQUIDS) Kit D51, only..... **85c**
(No ¾" model available but above Dwarf the greatest model value ever)

Curtiss Hawk P6-E

Colored like Hawks in 17th Pursuit group, yellow, olive drab, black and white. Our re-designed model is the most advanced type to be found anywhere. Many details. Often built by the best model builders when "first prize" is sought like our SF-49. Fast flights. Span 23⅝". Kit SF-21 ..... **$3.25**

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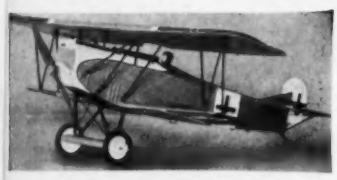


Fokker D-VII Fighter

Used by German aces, it earned the reputation of most efficient, fighter of the world war in actual service, being fast, maneuverable and could make long dives without shedding its wings. Redesigned model is 100% authentic, and beautifully colored, orange, green and white. Great flights. Kit SF-15..... **$2.95**

Howard Racer 'Ike' (Or 'Mike')

These popular twins are known to all air race fans, having many first place prizes. Our kit from which you may build either one, is easy to assemble into a beautiful decorative home ornament yet capable of interesting fast flights. Span 15⅝". All white. Kit SF-42..... **98c**

Waco "C" Cabinplane

The most popular fast cabin biplane in the world. Used by many sportsman pilots and business men. This model was designed for advanced model builders. It is a very good flier, is neat in appearance, and not to hard to construct. Span 24¾". Colored silver and red. Kit SF-37..... **$3.25**

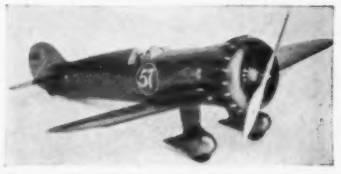
OUR KITS REALLY DO BUILD MODELS AS THEY APPEAR HERE

Wedell's Wedell-Williams Racer

Jimmy Wedell's own racer. Won Thompson trophy race with it in 1933 and later the land plane speed record. In 1934, Doug Davis won the Bendix Trophy with this same ship. Model is very accurate and excites interest and favorable comment everywhere. Span 19¼". Red, black and bronze. Kit SF-47..... **$2.95**

Laird "Solution" Racer

Charles "Speed" Holman won the Thompson trophy race of 1930 in this biplane. Model is of recent C-D design and employs the best type of model construction. Recommended for those who want an attractive fast flying model. Span 15⅝". Laird gold and black. Kit SF-46 ..... **$2.50**



Turner's Wedell-Williams Racer

Capt. Roscoe Turner with this ship won the '33 Bendix race and '34 Thompson race. Plane holds record for crossing the U.S. both ways. Forced out of first place in '35 Thompson race due to broken oil line. Span 19½". Wedell-Williams gold. Kit SF-48..... **$2.95**

WHY PAY MORE? ● DON'T RISK PAYING LESS! ● GET C-D's!

Aeronca C-3 Sportplane

Developments of this light plane have proven popular for a number of years. Beginners as well as advanced builders will want to build this fine flying model. Span 27". Very beautifully colored red and silver. Kit SF-40..... **$2.65**

Boeing Fighter F4B-3 (And 4)

Representative of Navy's high performance shipboard fighters, this Wasp powered biplane built in great numbers. Noted for its speed, maneuverability, fast climb and long power dives. Model well detailed, flies fast and far. Span 22½". Silver, yellow and red. Kit SF-29..... **$2.85**

Douglas O-38 Observation Plane

Used by National Guard units of the U.S. Army, this ship is utilized for observation, light bombing and advanced training. It is an excellent subject for model work intended for the advanced builder. Probably the best detailed C-D. Span 30¼". Yellow and olive drab. Kit SF-43 ..... **$3.75**

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"Most for your money" has been the C-D policy. The these Kits are making new every day. They're the model airplanes—and win prizes, more honors than a line in the world, so they best to constantly uphold thi wide reputation.

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Amazingly authentic, master signed for both exhibition and to prevent crack-ups, ri ored and detailed, somethin really proud of. More real s thrill building one C-D than ordinary models. Be a C-D builder! Start today!

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¾" Mod

These Kits are super-comp very last word in beauty, rea detail. Compared with co models they're the most un Kits in America—or the wor

No.	Name	Sp In
SF- 1	Gr. L. Sport Trainer	26
SF- 2	Travel Air Mystery	21 2
SF- 3	De Havilland-4	31 7
SF- 4	Curtiss "Jenny"	32 5
SF- 5	Laird Super-Solution	16 7
SF- 6	Polish Fighter	25 1
SF- 7	Curtiss Helldiver	23 7
SF- 8	Army Boeing P12-E	23 1
SF- 9	Sopwith SE-5	20
SF-10	Sopwith Camel	20 7
SF-11	A-W Quad Fighter	20 7
SF-12	Bishop's Nieuport	19 2
SF-13	Spad 13	19
SF-14	Fokker Triplane	17 6
SF-15	Fokker D-7 Fighter	21 1
SF-16	Albatross Fighter	22
SF-17	Bayles' Gee-Bee	17 1
SF-18	Howard "Pete"	15
SF-19	Supermarine S6-B	22 1
SF-20	Hawker Fury Fighter	22 1
SF-21	Hawk P6-E Fighter	23 4
SF-22	Macon Fighter	19 1
SF-23	Boeing F-20 Pursuit	20 2
SF-24	Lockheed Vega	30 2
SF-25	Curtiss A-8	33 7
SF-26	Heath Parasol	23 1
SF-27	Doolittle's Gee-Bee	18 8
SF-28	Monocoupe Sport	24
SF-29	Boeing F4B-3 Fighter	22 1
SF-30	Nieuport 28 Fighter	20 2
SF-31	Hall Racer	19 1
SF-32	Boeing 95 Mail	32 1
SF-33	Comper Swift Sport	18
SF-34	Fokker D-8 Fighter	20 3
SF-35	Boeing 247 Transport	55 6
SF-36	Lincoln Sportplane	15
SF-37	Waco C Cabinplane	24 9
SF-38	Buhl Bull-Pup	22 1
SF-39	B-J Fighter	25 1
SF-40	Aeronca Sport	27
SF-41	Vought Corsair V-66	26 7
SF-42	Howard "Ike"	15 6
SF-43	Douglas O-38 Obs.	30 1
SF-44	Page's Racer	23
SF-45	Martin Bomber	53 1
SF-46	Laird Solution Racer	15 7
SF-47	'33 Wedell's W. Wms.	19 1
SF-48	'34 Turner's W. Wms.	19 1
SF-49	Curtiss F11C-2	23 6
SF-50	Curtiss Export Hawk	23 6
SF-52	"Mister Mulligan"	23 6

★★★★★★★★★★★★

½" Mod

These are precisely like the ¾ els—with a few minor exc For coloring—we recommend t colors as used on ¾" desig same model. Remember (Kits DO NOT CONTAIN LIQUIDS, or STRIPING TA

No.	Name	Sp In
D- 1	Gr. L. Sport. Trainer	13 2
D- 2	Tr. Air. Mystery Ship	14 1
D- 3	DeHavilland-4	21 1
D- 5	Laird Super Sol.	10 5
D- 8	Army Boeing P12-E	15
D- 9	SE-5 (Scout, Exper.)	12 1
D-11	A-W Quad Fighter	14
D-12	Bishop's Nieuport	13 1
D-13	Rickenbacker's Spad	13 1
D-14	Fokker Triplane	11 3
D-15	Fokker D-7 Fighter	14 1
D-17	Bayle's '31 Gee-Bee	11 3
D-18	Howard "Pete" Racer	10
D-19	Supermarine S.6B	15
D-20	Hawker Fury Fighter	15
D-21	Hawk P6-E Fighter	15 3
D-23	Boeing P-26 Fighter	14 1
D-24	Lockheed Vega	20 1
D-26	Heath Parasol Sport	15 1
D-27	Doolittle's Gee-Bee	12 1
D-28	Monocoupe Sportplane	16
D-29	Boeing F4B-3 Fight	15
D-32	Boeing 95 Mailplane	22 1
D-33	Comper Swift Lightpl	12
D-34	Fokker D-8	13 5
D-35	Boeing 247 Transport	34 1
D-36	Lincoln Sportplane	10
D-37	Waco C Cabinplane	16 7
D-40	Aeronca C-3 Sport	16 1
D-41	Vought Corsair Fight	18
D-42	Howard "Ike" Racer	10 1
D-43	Douglas O-38 Obs	20
D-45	Martin Bomber	35 3
D-46	Laird Solution Racer	10 4
D-47	33 Wedell's W. Wms.	13
D-48	34 Turner's W. Wms.	13
D-49	Curtiss F11C-2	15 3
D-50	Turkey Hawk	15 3
D-51	De Havilland "Comet"	22
D-52	"Mister Mulligan"	15 3

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